THE ENGINEERING AND MINING JOURNAL.

VOL. XI.—NO. 8.—THIRD SERIES.] NEW YORK, TUESDAY, FEBRUARY 28, 1871. [SINGLE COPIES 10 CENTS.

Direct Pressure Steam Pump.

THE first investigator who described a way of raising water by the direct action of steam-pressure was SALOMO DE CAUS, in Paris, France, about the year 1615. He made a steam-boiler with a long tube passing inside down to within a few inches of its bottom; and when the steam was raised, the pressure drove the water out through the tube to a height proportional to the pressure. By this means, however, he only succeeded in raising the hot water of the boiler itself.

WORCESTER, in England, went a step further, and in 1655 he described what he called "a fire water-work;" he says that by it he has "seen the water run like a constant stream, forty feet high. One vessel of water rarefied by fire driveth up forty of cold water; and a man that tends the work has but to turn two cocks, that one vessel of water being consumed another begins to force and refill with cold water, and so successively, the fire being tended and kept constant, which the same person may perform in the interim between the necessity of turning the said cocks."

Experts have discussed the question if WORCESTER also raised water by the vacuum produced by the condensed steam, and no decision has been arrived at. Some think that he did; but it is more probable that the receivers were simply fed by a pipe introducing water from a higher level; any how, he had a check-valve in this pipe preventing the cold water from flowing back when the pressure of the steam forced it upward through another pipe to a higher level.

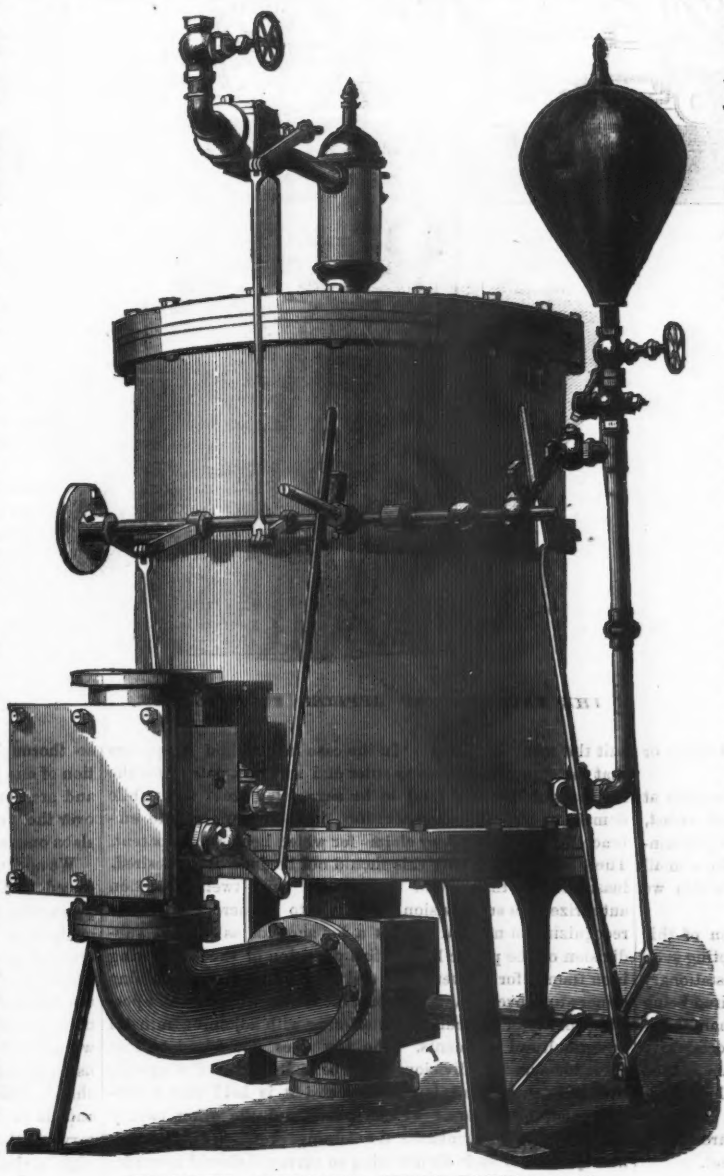
An important step toward the perfection of this invention was made in 1690, by PAPIN, a Frenchman, who had been banished from France for being a Protestant, and at that time was professor of mathematics in Germany. He showed how a vacuum could be produced by driving out the air from a vessel by means of steam, and when entirely filled with the latter, to close the vessel and condense the steam by cooling. However, the details of the machine he proposed were not practical; but use was made of the principle he had demonstrated by SAVERY, who was the next to attempt to raise water by steam-pressure. In 1699, he submitted a working model of an engine to raise water by fire, to the Royal Society of London, and made successful experiments with it.

It consisted of a boiler set in a brick furnace, and two strong air-tight receivers. The top of each is connected with the top of the boiler by means of a pipe and stop-cock, while a suction-pipe from a well also led to each receiver. These pipes, as well as the pipes which raise the water, have check-valves which open upward, so that water can only ascend in any of these pipes, and is prevented from returning when once raised. The operation was this: the steam of the boiler was, by opening one of the cocks, admitted into the corresponding receiver, and drove the air out; the cock was then closed, and the steam slowly condensing by contact with the receiver, which being exposed, soon cooled, a vacuum was formed and the water sucked up, or rather driven up by the atmospheric pressure, till it had nearly filled the receiver; when this had taken place, the cock was opened again, when, the steam rushing in, pressed the water up into the forcing-pipe. The double receiver was only intended to obtain a continuous jet of water. When one cock was open ed the other was closed, and *vice versa*. He improved this afterward by letting cold water flow over the receivers, in order to condense the steam more rapidly.

The next improvement was made by PAPIN, who described, in 1707, a similar engine, in which he placed a hollow float or loosely-fitting piston inside the receiver, in order to prevent the steam from coming in contact with the cold water, and not to become too soon partially condensed. The most curious feature of this machine was, that he proposed to discharge the water so raised on an overshot wheel, in order to obtain available power. As he actually raised the water with his engine seventy feet, he expected great results from such a wheel, and actually gives a detailed drawing of engine and overshot water-wheel in his French work on the subject, published in Germany, 1707.

SAVERY afterward improved his machine considerably. He made an additional boiler, to supply the first boiler with hot water, as supply-pumps, and much less injectors, were not yet invented, and engineers had before that time to blow off all the steam and withdraw the fires, in order to fill their boilers again with cold water, which involved an enormous loss of time. He made improvements in the cocks for admitting steam, and added a small cistern with cold water, which produced an intermittent flow of water over the surface of the receiver, in order to hasten the condensation. The manner in which he used the additional boiler to supply the first one with water was simple and ingenious. It was provided with a tube going to the bottom, and provided with a check-valve which caused water to flow from it into the first boiler, and prevented its return. When, now, the pressure in the second boiler was higher than that in the first, it discharged all its water into the same. Then the second boiler could be refilled and gradually heated, without stopping the working of the apparatus. In order to ascertain the quantity of water in both boilers, he attached gauge-cocks, different, however, from those of the present day. As his boilers were bricked up all round, he had them all in the top; but pipes were soldered to them reaching to different depths, so that he could draw steam or water according to circumstances, just as well as with the cocks now in use—a plan which might, perhaps, be useful occasionally even at the present day.

This machine was considered so perfect that it could not be improved; but miners could not be induced to adopt it in consequence of the danger of explosions, as the boilers were not provided with safety-valves, of which SAVERY appears to have been totally ignorant, notwithstanding they were known at least fifty years before in Germany, and even in England from the translations published in London, and that PAPIN applied them twenty years before his digester. It has been asserted by some that the only reason why SAVERY's engine was not at once universally accepted was the absence of a safety-valve on his boilers. But then, why was it not afterward extensively used when the use of safety-valves on boilers had become universal? Simply because, notwithstanding the boasted perfection of his engine, it possessed some grave defects, to which all imitations of this machine have been subjected to the present day. These have now, however, been overcome by the important improvements of Mr. JAMES H. PATTEE and GEORGE H. NYE, the inventors of the subject of our illustration. The labor of opening and closing the valves had already been overcome by other inventors, who attached them to floats; but these were found unreliable and also not to open or close at the right instant. The chief objection, was the alternate extremes of temperature to which the receiver was subjected. When the cold water was being expelled, the steam taking its place was, during the expulsion, partially condensed by the cold sides of the vessel, losing thus a portion of its pressure and heating the vessel, which is at once cooled off again by the reëntering water. Condensation also took place on the surface of the water in the receiver as soon as the steam entered, forcibly stirring this surface and heating it as well as the sides of the vessel. Hence the waste of steam in all these steam-pumps was enormous, and the results were very unfavorable when compared with ordinary steam-pumps, three to four times as much steam being consumed for a given amount of water raised.



IMPROVED AUTOMATIC STEAM VACUUM-PUMP.

As the engine in question has the enormous advantage of extreme simplicity, it was worth while to labor to overcome the objections. All the expensive features of the complicated and heavy low-pressure pumping-engines are wanting. There is no bored-out steam-cylinder; no well-fitting piston and valves; no air-pump with its piston and valves; no accurately turned pump-cylinder with its piston and valves; no working-beam, connecting-rod, etc.; no piston-packing to get out of order; in fact, if the principle of the engine in question had not been explained by us here, and if we had commenced by asserting the existence of a pumping-engine in which all these parts were totally absent, many would most assuredly have doubted the truth of such a startling statement. It is evident that the first cost of such a machine, being so very simple, must be far less than that of an equivalent ordinary steam-pump. It takes up much less room, and as the steam-pressure acts immediately on the water to be raised, without the intervention of all those complicated details of machinery, merely the power saved in momentum of these ponderous moving masses, and of their friction, would be an important item of economy.

The manner in which the chief objection has been overcome is as beautiful as it is simple. The inside of the receiver has been lined with a non-conducting material, wood, so that during the operation no changes of temperature are observed on the outside of the cast-iron cylinder, which is the only large and heavy portion of the machine. Our figure, which, we are confident, will be considered by connoisseurs as a fine specimen of mechanical engraving, shows near the top the tube through which the steam is introduced. Under the opening in the cylinder-head, through which the steam enters, and hence inside of the cylinder, is a flat surface, against which the steam strikes, so that it diffuses itself in a horizontal direction, spreading quietly and evenly over the surface of the water, with which the cylinder is not entirely filled; the precaution having been taken to always leave a thin layer of air over the top of the water, which is a very essential precaution, as this stratum of air, being a very poor conductor of heat, acts as a kind of piston to separate the steam from the water. Air being twice as heavy as steam, will naturally remain below, and the interpenetration of these two gaseous substances requires more time than is allowed at every stroke of the engine, and even if taking place to a certain extent, very little heat will be lost by the contact of the water with the steam, as it is well known that water is also a bad conductor so that even if heated, only a very thin film will be affected, provided the surface is not stirred, and as the hot film of water is lighter than the cold water below, it will naturally remain at the top where it is. This important fact, sometimes overlooked, is treated

elsewhere in this paper in detail, and is of the utmost importance in regard to the engine in question, being a purely incidental advantage, which assists in securing its success.

We will now explain the working of the engine. As the steam is turned on at the top of the cylinder, and fills the same, it is clear that by the condensation of this steam a vacuum will be formed. The cylinder is connected below, by means of an inch tube, with the well whence the water is to be raised, and which may be at a distance below the machine of not more than thirty feet, since, according to the well-known law of atmospheric pressure, a vacuum cannot raise water much beyond this. This tube is provided with a check-valve in the square box, (seen below the cylinder,) which, as it opens upward, prevents the water raised from returning. The axis of this check-valve (seen to project at the right-hand side) serves two purposes: it is, of course, lifted by the ascending water, and when the suction ceases and the water stops in its ascent, it closes by its own weight, assisted by a sliding weight, which may be suspended to the empty lever attached to the axis. This sets two other levers in motion; the one projecting toward the reader turns on the steam at the top, by the intervention of a few other levers, and the other opens a cock connecting the inside of the conical air-vessel (seen at the upper right-hand corner) with the lower part of the cylinder. The steam now being admitted over the surface of the water, which nearly fills the cylinder, will drive it out through the ascending pipe, to be attached to the top of the valve-box, seen at the left hand, and also a small portion into the conical air-vessel, (at the upper right side,) compressing the air on the top of the water thus introduced, which serves as an injector for the condensation of the steam. The valve-chest (at the lower left side) possesses also a check-valve opening upward, which closes as soon as the steam pressure has expelled the water from the cylinder, and the axis of this check-valve, (seen projecting outward,) is provided with a lever which by means of a rod and catch (seen in the figure) turns off the steam, and at the same time opens the communication between the conical air-vessel and the cylinder, so that the compressed air suddenly injects all the cold water, with which it is partially filled, into the cylinder. This, of course, at once condenses the steam, the vacuum is again formed, the cylinder is filled by suction, or rather by atmospheric pressure from below. When the cylinder is nearly full again, the check-valve in the chest below closes, and the same operation is repeated.

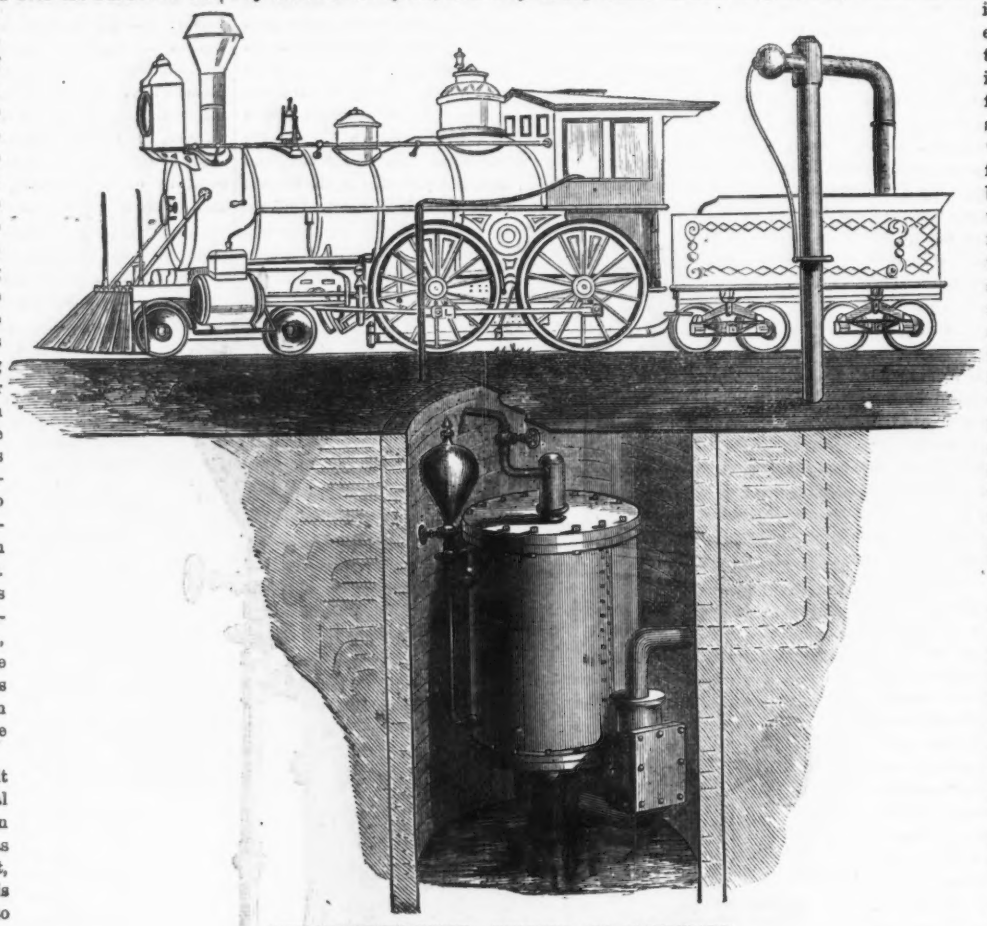
It is claimed for this pump that it is as effective and more economical than any other steam-pump now in use, and it is self-evident that, as there is so little machinery about it, and as it has no piston-packing, it is easily repaired without recourse to machine shops, and there mus be less wear than in any other pump, while sand and salt or any other sediment cannot obstruct or injure it.

We recently examined a pump of this kind in operation at the large fat-boiling establishment foot of Forty-fifth street, East River, New York. It raised 200 gallons of water per minute to a height of nearly 50 feet, and was supplied by a small steam-boiler, stated to be of 5 horse power, but which we rated lower.

Our second figure represents a special application of this pump for feeding the tender of locomotives; by accepting such an arrangement, it will be unnecessary to have stationary power, with its complex appendages, all that is required being that the pump shall be placed under a shed, less than thirty feet above the surface of water to be raised. The locomotive boiler is properly connected with the same, the steam turned on, and in no more time than it takes now to fill the tender from an elevated reservoir it is filled with the water from any low level, which, as all locomotives carry high-pressure steam, may be considerably below the track, say 50 or 100 feet.

In conclusion, we observe that this steam-pump could be made to act by pressure alone, by suction alone, or by both, as described. In the first case, the cylinder may be placed so low that the water would flow in by itself; but then the advantages of the vacuum formed by the condensed steam would not be utilized. In the second case, the cylinder is placed at the full height to which the water can be raised by atmospheric pressure; then it would work to the greatest advantage and in the most economical way, as low steam, say of one pound pressure, will fill the cylinder, and by condensation produce the same vacuum, as high-pressure steam. At low temperatures we lose less heat, and have the same amount of steam in a larger bulk, filling the cylinder with a less expenditure of steam, and obtain the same result as with any other vacuum, namely, we raise the water by atmospheric pressure to about 30 feet, thus taking advantage of this agent to its fullest extent, and if the cylinder is placed so high that the water simply flows out, when the steam enters, it is possible to raise water actually 30 feet high, with steam of even less than one pound pressure, a feat which likely no other steam-pump can perform so well.

The pump may be used for city water-works, mines, railroads, steamships, breweries, sugar refineries, tanneries, manufactories, or, in fact, in any situation where any other pump could be applied. It is manufactured by the Automatic Steam Vacuum-Pump Manufacturing Co., 111 Broadway, (room F, basement) New York, where communications may be addressed.



THE VACUUM-PUMP APPLIED TO RAILWAYS.

Important Mining Decision.

We take the following from the Sacramento *Union* of a late date. It is a matter of great importance to those intending to pre-empt mineral lands: "A case has been presented to the General Land Office, in which an application for patent for 160 acres of surveyed placer land was rejected by the Register and Receiver at Helena, Montana, for the reason that the claim in its exterior limits did not conform to the legal sub-divisions of the public lands, as required by section 12 of the amendatory mining law of July 9th, 1870. The Commissioner, upon a review of the case, has just reversed the decision of the Register and Receiver, and decided that ten-acre lots on surveyed land in mining States and Territories are legal sub-divisions of the public lands; and that such legal sub-divisions may be either ten by ten, or five by twenty chains in size, to suit the case. He says: 'In the case in question it appears that the applicant desires to enter and secure a patent for the 160 acres of surveyed land to be segregated from the public domain in contiguous ten-acre lots, in such manner as to embrace the gulch or placer claims for which he desires a patent. There is no reason why this should not be done if so desired, inasmuch as the second proviso to said twelfth section authorizes the sub-division of forty into ten-acre tracts, thus recognizing in mineral regions a ten-acre lot as a legal sub-division of the public lands; this provision of the law having been framed for the very just and liberal purposes of enabling miners to prove up and pay for their claims with the least possible chance of difficulty or interfering with adjoining mineral or agricultural claimants. The law does not stipulate that these ten-acre sub-divisions shall be in the form of a square, each side measuring ten chains, and it is held that a ten-acre tract, one side of which is five and the other twenty chains, will better embrace the mining premises applied for; no objection to such claims being so surveyed should be made, provided, of course, that such surveys are not run diagnonally to the lines of the regular surveys, but are parallel to the same, so that the public lands from which such tracts are segregated may be described and disposed of without confusion or difficulty. In the case under consideration, should the views of the Register and Receiver be sustained, the mining claimant would be compelled, if he entered the land at all, to embrace in his application 400 instead of the 160 acres desired by him, a large portion of which may be occupied by adjoining claimants, either for mining or agricultural purposes, or it may be barren or waste, unfit for either purpose. To require mining claimants in cases like the present to postpone making applications for patents until adjoining miners are willing to unite in making a joint entry of their respective claims, or to include in their applications large areas of worthless land to be paid for at double the minimum price of good agricultural land, would not only be a hardship upon the miners, but inconsistent with the spirit and intention of the statute.'"

A New Process for Refining Cast Iron.

THE inventor of this process, Mr. JAMES HENDERSON, furnishes the following account of his improvement, which we extract from *Nature*.

An article was furnished a short time ago, and published in *Nature* (No. 57, p. 94), respecting a new process for the production of steel by the partial decarburization of cast-iron, invented by the writer. It was then stated that a description o a new process for refining cast-iron would soon follow.

This process supplies a more effective and economical process than the English finery or the German reverberatory furnace processes for refining cast-iron. It is very simple, and does not require any fuel, labor, or expensive apparatus; and there is no loss of weight of iron, as the impurities go off in vapor. The cost of refining is less than one-twentieth of that of the English and German processes; and its effect is more thorough than is possible by those systems.

The agents used are fluorine and oxygen combined. The fluorine is derived from any fluoride, and the oxygen from any substance containing or capable of evolving oxygen, which is adapted to use in the manufacture of wrought-iron and steel. Fluorspar and pure rich iron ores are the most available and economical substances for producing these agents, and are applied finely powdered and mixed, and placed in receptacles, preferably, so as to act from the under side upwards upon cast-iron in its molten state. The most economical mode of application of this process is to treat the cast-iron in the condition in which it flows from the blast-furnaces, with fluorspar and iron ore, applied in the "chills" or pig moulds used at blast-furnaces, by being spread over the bottom of the moulds. The iron, when tapped from the blast-furnace, flows into the mould thus prepared; the heat of the iron causes fluorine and oxygen to be liberated, and, by reason of the affinities of these substances for silicon and phosphorus, these impurities are removed in the form of vapor. The reactions in the "chills" are similar to those of the boiling puddling process, and last about five minutes. The metal during this period is covered with jets of flame and smoke. The resulting metal, with respect to silicon and phosphorus, is as pure as wrought-iron.

It is preferable to use iron ores containing the largest amount of oxygen and the least of silica and phosphorus. These conditions exist in "washed iron sands," and the red hematites of Cumberland and Lancashire. When using the hematite ores, varieties that are the easiest to reduce to powder are preferred; and the ordinary edge running apparatus, with cast-iron rollers revolving in a pan, is an excellent one for the purpose.

The fluorspar and fine ore are passed through a sieve of not less than four hundred meshes to the square inch, and afterwards mixed so thoroughly as to appear to be one substance, in the proportion of one part of fluorspar to two parts by weight of iron ore, and are spread one-fourth to three-eighths of an inch deep over the "chills," then the iron is run upon them so as to form slabs one inch thick.

We append to this article analyses of refined cast-iron produced in the reverberatory furnace. It will be seen by comparing the analysis of the refined metal of this process with the analysis of that of the reverberatory furnace process, that they are analogous, except that the latter contains no silicates or graphite. The refined metal of the pig-mould process saves the fuel and time taken for refining by the reverberatory furnace process, and shortens the time of producing steel or wrought-iron by that process fully forty minutes. When using the refined metal of this process, two workmen can take charge of five ordinary boiling puddling furnaces making steel, and six furnaces making wrought-iron, as the only labor necessary is "balling" and removing it from the furnace. When high carburized steel is made, "balling" is not required, as the metal will be fluid enough to run from the furnace into ingot-moulds.

The economy of the process consists in the saving of the labor of eight workmen making steel, and two workmen making wrought-iron; and in the superior quality of the result as compared with puddling the refined metal. The time occupied by the conversion of the refined metal into steel or wrought-iron by the process without puddling is about the same as that usually taken in puddling pig-iron.

Ordinary coke pig-iron, smelted near Pittsburgh from a mixture of hematite ore and mill cinder, has been treated by this process. The refined metal was afterwards puddled and rolled into "muck" bars, and once heated and rolled into merchant bar-iron. The pig, refined cast, and wrought-iron, have been analyzed by an analytical chemist in this city. These analyses are annexed, also analyses of refined cast-iron by the English finery and German reverberatory furnace process, and of the highest standard qualities of English, French, Swedish, and

Russian wrought-iron, are given for comparison, taken from PERCY'S "Iron Metallurgy" and URE'S Dictionary:

	Pittsburgh Coke Pig-iron.	Patent Refined Cast-iron.	Bar-iron.
Carbon (combined)	0.2040	0.3613	not deter.
do. (graphite)	2.7685	2 5066	—
Silicon	2.9096	none.	none.
Slags (silicates)	0.3623	0.2983	not deter.
Phosphorus	0.4196	0.1029	0.0087
Sulphur	0.1298	0.1269	0.0438

ANALYSES OF FOREIGN IRON.

	English Finery Process. Refined Cast-iron.	German Reverberatory. Pig-iron.	Furnace Process. Refined Cast-iron.
Carbon	3.07	—	—
Silicon	0.63	4.66	0.62
Phosphorus	0.73	0 56	0.50
Sulphur	0.16	0.04	0.03
Silica, Alumina. (Silicates)	0.44		

	English Wrought-iron. Low Moor Stamp.	French. Petin, Gaudet & Co.	Swedish. Hoop L.	Russian. C C N D
Carbon	0.016	0.143	0.087	0.272
Silicon	0 1?2	—	0.115	0.002
Sulphur	0.104	0.058	0.220	0.294
Phosphorus	.106	0.030	0.034	—

On comparing the analysis of the refined cast-iron of the patent process with those of the English and German processes, it will be seen that while the refined iron of the new process contains *no silicon*, that of the English and German processes contains 0.63 and 0.62 per cent. respectively; and compared as regards phosphorus, the German process reduces it from 0.56 to 0.50 per cent., or about 0.06 per cent., and the new process reduces it 0.32 per cent., or over five times as much phosphorus is removed by the new process as by the other processes. The slags or silicates are over 0.15 per cent. less than in the refined iron of the English finery process. The analysis of the patent refined cast-iron, compared with that of the above English wrought-iron, shows that whilst the wrought-iron contains 0.122 per cent. of silicon, the refined metal contains none, and compared as regards phosphorus they are about the same.

The analysis of the puddled wrought-iron, made from the refined cast-iron by once heating and rolling the puddled or "muck" bar, shows a poorer quality of iron than the most celebrated makers of Europe produced from the purest ores with charcoal.

The economy of using the refined metal in saving cost of labor, fuel, etc., for the puddling process, has been fully demonstrated by numerous trials. When all the advantages of the process are realized, about one-half of the cost of converting cast-iron into wrought-iron can be saved; and there is an improvement in the quality equal to the difference between ordinary forge pig-iron and charcoal-iron.

These advantages are:—

1. Better quality, which is due to the purity of the refined metal; as good qualities of wrought-iron are produced from it as from pig-iron made from the best ores smelted with charcoal.

2. The refined metal being as pure as wrought-iron, with respect to silicon and phosphorus, requires merely decarbonizing, with less skill to work it, and greater certainty of the quality of the product.

3. Large saving in cost of production, owing to the shortening of the time of puddling, which is caused by the removal of a large part of the impurities by the refining process. White refined iron is decarbonized in twelve to fifteen minutes, and a "heat" or charge of five hundred pounds is puddled in fifty-five minutes, including time of charging, melting the iron, and stirring or puddling or "ba ling" and removing it from the furnace; grey forge iron requires sixty-five minutes, and foundry iron about seventy minutes. Seven "heats" or charges to a "turn" or a day's labor, are of easier accomplishment than five charges are from the pig-iron from which it was produced; the five charges now require ten hours to convert pig-iron into wrought-iron. It is possible to obtain, with the patent refined metal, by employing three sets of workmen in twenty-four hours, instead of two sets as is now customary, twenty-one charges in twenty-four hours instead of ten charges; and allowing sufficient time for repairs, the production of any iron-work may be doubled, without additional investment of capital and without additional cost of repairs.

4. Saving of fuel per ton of iron produced, amounting to one-half, caused by increased production.

5. Reduction of general business expenses per ton of iron, amounting to one-half, caused by increased production.

6. Reduction of wages, by reason of the diminished labor, of 40 per cent. per ton of iron.

7. The puddling furnace cinders of the refined metal contain but about one-fourth of the phosphorus, as compared with the cinders resulting from the use of pig-iron; and when smelted produce better qualities of pig-iron.

The cost of refining in the pig-moulds is very little. Fluorspar is a cheap material, and but about seventy pounds are required to refine a ton of iron. The cost is nearly compensated by the saving of the fuel and lime which would be required to reduce the puddle cinders of the refined cast-iron to pig-iron, as they contain but small portions of silica, and will require less fuel and limestone. The residue of the flourspar and oxide is agglutinated, and remains in the pig moulds, and is pure lime and deoxidized iron ore, and is available as so much lime and ore in the blast-furnace.

Transportation of Coal on English Railways.

DURING the year 1870 there were carried to London by the various railways having termini there 3,758,089 tons of coal, being an increase, as compared with 1869, of 416,504 tons. Of the total quantity the Great Northern carried 978,049 tons, the Midland 923,660 tons; London and North-Western 835,281 tons; the Great Eastern 507,344 tons; and the Great Western 470,852 tons. The largest increase on the year was by the Midland—being 163,677 tons; the London and North-Western follows next with 81,561 tons, and the Great Northern, 66,210 tons. The greatest quantity sent from any place was 385,632 tons from Clay-cross, being an increase for the year of 28,355 tons. Of Silkstones, the Great Northern carried 132,543 tons, against 117,293 tons for 1869. From the northern coal field there was conveyed by the same line from Unsworth, 101,397 tons; from Lambton, 64,414 tons; and from Brancepeth, 17,379 tons. The London and North-Western carried from the Wigan Coal and Iron Company's collieries 95,062 tons, and from Merthyr 30,364 tons.

Engineering Progress in India.

THE following article from *Engineering* presents a broad and cheerful view of the state of affairs in India. We give it almost entire:

During the past four years the engineer establishment of the Public Works Department has increased from 547, of whom 301 were military men and 246 civilians, to 869, of whom 363 are military and 533 civil officers. Thus, whilst in 1865 civil engineers formed barely 45 per cent., their strength had risen, according to the latest returns, to 59.5 per cent. of the whole engineer establishment, and whilst only 62 were added of military men, the increase in the number of civil engineers amounted to 287, of whom 132 were appointed by the ordinary competitive examinations, and 80 engineers were selected for temporary employment in some of the superior grades of the department, thus making 212 who were sent out from this country, leaving only 75 for promotions of subordinates and other appointments made in India. That the rapid increase in numbers of civil engineers, and their consequent increase of influence in the department, raised the jealousy of their military companions, there can be no doubt, and this feeling found its expression in the "Obnoxious Notification" to which we drew attention at the time of its appearance. The stand made by the civil engineers in India, and by the Council of the Institution at home, against the charges alleged therein, have at length begun to bear fruit. In the first place, so far from the civil engineers being sufferers from this attack made upon them by their military companions, the injustices to which they have long submitted in the Public Works establishment have, since the publication of that Notification, been in some measure removed. They have already been placed upon an equality with military engineers in point of departmental salary, and it is reported that an order of precedence has been laid down for them; but there still remain the questions of furlough and pensions to be determined before it can be affirmed that their claims have been equitably adjusted, and we consider it not at all improbable that the new method to be adopted for making appointments of civil engineers from this country, will necessitate the removal of their remaining grievances, and at the some time elevate the general status of the service by infusing into it an *de corps esprit*, which is at present somewhat wanting. One great change has been introduced during the past year in the method of recruiting the Indian Public Works Department. Having in view the steady and continuous augmentation which the Public Works establishment will henceforth require for the purpose of carrying out the vast system of State railways which has been commenced, and for the more rapid provision of irrigation works throughout the land, it was naturally thought that the existing precarious source of supply could no longer be relied upon, the more so as it had already ceased to provide the numbers required, and the Indian Government has therefore determined to train its own engineers, and is about to establish a small college for the purpose, under the presidency of Lieutenant-Colonel G. CHESNEY, R. E., assisted by a considerable staff of professors and teachers.

The total expenditure incurred in the prosecution of Public Works in India during the past five years has also been annually increasing, and has been gradually raised from £4,665,947 in 1865–66 to £7,762,050 in 1869–70, whilst the estimated expenditure in 1870–71 is set down at £7,475,560, being a decrease of a little over a quarter of a million sterling upon the sanctioned amount for the preceding year. It must not be supposed that these enormous sums are entirely met from the surplus revenues of India, for with the creation of a separate irrigation department, in January, 1867, it was determined that the surplus revenues devoted to the construction of public works should be augmented by money raised on loan, whenever it might be found practicable profitably to expend, on the construction of new irrigation works, larger sums than could be allotted from that source for such works. This principle has since been further extended, and it has been laid down that reproductive works shall be constructed, as a rule, from money raised on loan for the purpose. The works at present entered under this head are irrigation works and State railways.

The two most important classes of work at present under construction in India are undoubtedly those of irrigation and railways, and it may safely be asserted that the one is to a certain extent dependent upon the other. Even at the present day it is found that whilst famine rages to a greater or less extent in one part of India, grain is actually a drug in the market at a distance of only a few hundred miles away; and it is only by increasing facilities of communication throughout the country that such an apparent anomaly can be obviated. On the other hand, as railways must, to a great extent, depend upon the local trade of the districts through which they pass for their paying traffic, the more productive those districts can be made the better it must be for the commercial prosperity of railways. This can be secured in no means better than by the liberal extension of irrigation works. These latter are also of so much local importance, and have also attracted the attention of native rulers in past generations, that they deserve, perhaps, more notice than could be devoted to the subject upon the present occasion; in order, therefore, to do it more justice, we shall devote a separate article for the purpose of recording their progress during the past five years. With regard to railways, we find that in 1866 the total length of line sanctioned was 4944 miles, which has now been increased to 6249. This additional length is made up in the following manner, viz., increase of length to the East Indian, 2 miles; Great Indian Peninsula, 5 miles; Madras, 42 miles; Bombay and Baroda, 74 miles; Great Southern, 212 miles; which, together with the following new lines, viz., the Oudh and Rohilkund, 672 miles; the Carnatic, 100 miles; Northern Punjab, 173 miles; Khamgaon, 8 miles; Oomrawuttee, 7½ miles; and Nulhattee, 27½ miles in length, make up the total increase of sanctioned lines. On the 1st of May, 1866, there were 3331½ miles open for traffic, which has now been increased to 4711½ miles, being at the rate of about 276 miles of new line opened per annum.

In connection with this subject may be especially noted the opening of the bridge over the Sutlej River, on the Delhi Railway, on the 15th October last. This bridge crosses one of the most formidable rivers in India, and is believed to be, with one exception, the longest in the world, its length being 6468 feet between abutments, or nearly one mile and a quarter. The total amount of capital authorized to be raised for the construction of the guaranteed railways, but exclusive of the cost of those called State lines, is £91,572,700, of which £60,644,778 had been expended up to the 30th April, 1866, and £83,444,147 up to the 31st March last. Between the same periods the gross receipts have risen from £3,122,480 to £5,709,382, and the expenses from £1,565,437 to £3,188,430. Notwithstanding the great expense at which Indian railways have been constructed, these high rates have not been sufficient in all cases to insure excellence of workmanship. Several failures of bridges have from time to time occurred, but the most notable event of this kind was the sudden collapse of the great viaduct on the Bhore Ghaut Incline of the Great Indian Peninsula Railway, on the 19th July, 1867. This accident arose from defective construction, and several other works on the same line were, upon inspection, found to be almost equally faulty. In a despatch dated 16th January, 1868, the Secretary of State for India desired that a comprehensive scheme might be drawn up for the future extension of railways in India, and which lines should, to a great extent, be constructed entirely by Government agency. The report of Government contained a list of twelve lines, and it was estimated that about 10,000 miles of additional railway would provide necessary accommodation through all the chief provinces. Although several of the proposed new lines have already been sanctioned, active operations have been delayed until the decision of the Government in India shall have been received as to the gauge upon which those lines shall be constructed, the committee appointed last year to report upon this subject having been unable to agree, and which resulted in the submission of two reports, recommending respectively gauges of 3 feet 6 inches and 2 feet 9 inches. The close of last year saw the connection by railways of the principal capitals of India all but completed; thus Calcutta and Bombay, and Bombay, Delhi and Lahore have now been brought into railway communication with each other, whilst the connection between Bombay and Madras is only separated by the Kistnah river, which has not yet been bridged, and about 15 miles of railway have still to be completed to the south of that river.

Together with railways, India has, during the past five years, considerably increased her system of telegraphs. In 1866 the Electric Telegraph Department was completely recognised, and the position of its employés improved. Three years' experience of open competitive examination for the purpose of recruiting the staff showed conclusively that such a plan could not be relied upon, and a system has since been adopted of nomination, the nominees, after passing a preliminary test examination, being specially trained for their future profession under direct supervision of the Home Government. By this means the Department has subsequently been sustained, but we believe it is not intended at present to make any further appointments in this manner. It is not improbable that for the future candidates for the Telegraph Department will be trained at the Civil Engineering College. In 1866 a Select Committee of the House of Commons was appointed to inquire into the working of the system of telegraphic communication between England and India, which led to an improvement of the lines connecting the Persian system with Europe, and the construction of a direct line between Alexandria and Bombay by way of Aden.

It is not possible to state to what extent new roads have been constructed during the period under review, but whilst some new main lines of communication have been laid out, far greater advantage to traffic have been secured by the construction of feeders to the different lines of railway. Steam road rollers have, during the past year, been introduced into the Central Provinces, and others have, we believe, been employed for some time past in Bombay, Calcutta, and a few other leading towns. The navigation of rivers in India does not now possess so great importance as in former years, when no other means of conveying heavy goods existed throughout India; extensive works have, however, been going on for some years past with a view to improve the navigability of the Godavery so as to afford an easy means of export to the Madras coast, of the products of the Central Provinces cotton-fields. The works, however, drag on their progress so slowly that in all probability a railway from Chanda will be completed first, and so carry all the cotton to the Western instead of the Eastern coast. India is notoriously badly off for harbors, but works have for some years past been in progress for improving the important harbor of Kurrachee, but like most other Indian works of any magnitude its progress is retarded for want of funds. The erection of one of EDWIN CLARK'S hydraulic graving docks at Bombay, which must be by this time nearly com-

pleted, will supply a want which can at present be afforded by no other port in India. The proposed port on the river Mutlah, near Calcutta, upon which so much public and private capital has been expended, is likely to become totally abandoned, whilst the shipping facilities at Calcutta have just been greatly extended by the erection of jetties by the side of which vessels can load and unload without discharging their cargoes into boats. With the view to still further improving the existing harbors, a Mr. ROBERTSON has recently been appointed as harbor engineer to Government, and has gone out for the purpose, in the first instance, of reporting upon Aden harbor, and the different ports round the coast of India. Several new lighthouses have been constructed off the coast of British Burmah and in Bombay harbor within the period embraced by our present review.

The researches of the past few years have brought to light several new coal-fields in India, the importance of which cannot well be over-estimated, as one of India's great wants is a sufficient supply of fuel. Mr. MARK FRYAR was sent out as a mining engineer a few years ago, and within the last few months Mr. MATTHEW COLLIN has gone out in the capacity of coal viewer to the Indian Government. The most recent discoveries have been those in the neighborhood of Chanda, but no coal has at present been proved south of the Kistnah.

Few will forget the great impetus given to every kind of speculation in Bombay during the cotton mania produced by the American war, and amongst other speculations none were so much in favor as reclamation schemes. Several of these have since collapsed, and during the past year the estate of the Elphinstone Land and Reclamation Company has been purchased by the Government. New and magnificent Government and other public buildings have been undertaken throughout India, but more particularly at Calcutta, Bombay and Allahabad, and the manner in which they have been constructed at the last-named place, brought down, the heavy censures of Government. Owing to the great increase of European troops in India, and their redistribution over the country, a comprehensive scheme for new barracks was prepared in 1865, the total cost of which was estimated at about ten millions. Since then considerable amounts have been annually expended upon these works; but it is to be feared that the palatial double-storied buildings erected have proved anything but suited to the requirements of an Indian climate, being described as "hot-houses in summer and ice-houses in winter."

It would be impossible, within the limits of a single article, to comprise all the principal works of progress carried out in India during the past five years. Having already noticed some of the most important ones, we may now briefly mention that, within the above-named period, a system of sanitation has been introduced into India, necessarily directing greater attention to drainage and water supply. The manufacture of Ransome's stone has been commenced at Bombay. The process of constructing embankment upon what is known as the "silting process," was commenced by Mr. MCIVOR, in the Neilgherry hills, in 1869, and appears thus far to have proved successful. The embankment of rivers in Cuttack and Burmah has been extended. The trigonometrical survey of India, originally commenced about the beginning of the present century, has nearly been completed, so far as the primary system of triangulation is concerned; and considerable progress has been made with the geological survey.

Test for Hyposulphite of Soda.

ACCORDING to the *Journal fur Chemie*, the most delicate test for hyposulphite of soda is permanganate of potash. Its application is simple and easy, and well adapted, therefore, to the wants of the working photographer. One decigramme of pure permanganate of potash and one gramme of chemically pure carbonate of soda are dissolved in half a litre of water, yielding a transparent rosy-colored solution. This liquid, on coming in contact with the most minute trace of hyposulphite, loses its red color, and assumes a greenish hue. A finer red than this probably does not exist. LICHT enumerates other tests for hyposulphite, which are more or less practical in their nature, but are, nevertheless, well worthy of record. (1) The test based upon the blackening of sugar of lead paper by means of hydrogen, produced by the action of pure sulphuric acid upon pure zinc, when the fluid in the gas-generating vessel contains hyposulphite of soda. (2) The galvanic test, in which pure silver foil, under the influence of an electric current, becomes of a yellowish or brownish color in the presence of hyposulphite of soda. (3) GRUNE'S test, where a collodion film, rendered of a whitish color by the application of chloride of mercury, fulfils the duty of reagent, and assumes a grayish tone when affected by hyposulphite of soda. (4) The very precise test afforded by the use of blue iodide of starch, which bleaches readily when hyposulphite in minute quantity is mixed therewith. It is probably only the first and last of these tests that will be found practical in photographic operations.

A New System of Railway Signals.

STEPS are being taken by Mr. EDWARD HODSON and Mr. RICHARD HILL, two workmen at Bolton, for patenting a method which they have devised and believe to be new for railway signalling. The proposal is to lay between, or at the side of the line of rails, a rod-like apparatus, in the form of an inclined plane, which may be raised by a lever and wire rope or rod attached to the signalman's box, in the same manner as the semaphore signals are at present worked. When the inclined plane is raised to danger its upper end stands at a height of 6 inches above the level of the rails. As the complement of this apparatus, it is proposed to fit every engine using the line with a projecting lever, which shall so far depend from the engine as to knock against the inclined plane when it is raised to danger. It is proposed that the engine lever should be so connected with the other mechanism of the engine that the effect of this contact would be at once to sound the engine whistles, or, if thought advisable, it might be so arranged as to shut off steam. In any case the engine driver would be made aware by an unmistakable signal of the existence of danger ahead, irrespective of the ordinary lamp signals, which in dense fogs are comparatively useless. The apparatus may be worked at a distance of 600 or even 800 yards from the signal-box, in the same way as the ordinary semaphore. A very similar plan was some years ago submitted to Mr. RAMSBOTTOM by Mr. MACKIE, of Warrington, and was at once pronounced unsuited to the purpose, through the concussions that would take place. The invention is as old as the railway system.

MINING SUMMARY.

Eastern Oregon.

TO THE EDITOR—SIR: Permit me to give you some information in regard to the early settlement, character and present development of the mines in Union and Baker counties, Oregon. In the fall of 1861 Mr. Griffin, and party of men, in prospecting in the Blue Mountain range, discovered what is known as Griffin Gulch, a tributary of South Powder River. The gold found was coarse and in sufficient quantities to warrant them in locating for mining purposes. At that time the only settlement east of Blue Mountains, I might say in Oregon, south to the California line, and eastward to Snake River, was that of Mr. B. Brown and a few others, in Grand Rond Valley for grazing purposes. Geo. Abbott, and two or three other men, had started beef cattle from Umatilla Valley for Salmon River Mines, but were driven back from Snake River to Grand Ronde Valley by the Indians and snow. Here they wintered their cattle without any loss, and be it remembered this was the most destructive winter for cattle since the first settlement of Oregon. To get supplies to Griffin Gulch, the miners had to go to Walla-Walla or the Dalles, a distance of one hundred and fifty to two hundred and fifty miles.

As soon as the fact that paying gold mines had been discovered on the waters of Powder River had become known, Mr. Abbott drove the cattle designed for Salmon River to Blue Canyon, where Auburn now stands, which had been found by Mr. Kirkpatrick, Geo. Hall and others. Blue Canyon was distant from the discovery or Griffin Gulch about four miles. The character of the gold found was excellent, from fine grains to nuggets weighing from one to three and more ounces. Mr. Abbott believed that a new and valuable gold field was discovered here, and going to the Dalles, together with Mr. Knight, bought and shipped some goods by pack-train for Blue Canyon. Mr. Du Gay also arrived with goods about the same time; Messrs. Cranston, Moore, Norcross and others soon followed with goods. Before and after all these miners from every point of the compass came pouring in, ready for anything new in the way of mining. The town of Auburn was laid out in lots about June 16th, 1862. Mr. J. W. Peters and Knight, Abbott & Packwood had buildings up for stores, and moved from their tents into them before the 4th of July following. The population in that vicinity, dependent for supplies from Auburn, was not less than from three to four thousand persons by September of the same year. At one time, in 1862 and 1863, Auburn had forty stores and saloons. There was a large number of emigrants from the States that year for Salmon River and Oregon. A large proportion of these remained in the vicinity of Auburn and Powder River Valley.

Auburn is justly entitled to be called the mother of mining camps in Eastern Oregon and Western Idaho. From Auburn prospecting parties were fitted out and the country explored in every direction. Grimes' party discovered Grimes' Creek—in fact, the great Boise Basin. Rogs Smith, Jack Long and others found Granite Creek, and laid out the town of Independence on this creek, about July 4th, 1862. Cañon City was largely settled by Auburnites. The Owyhee mines were the result of discoveries made by Uncle Tom Turner's party in search of Sinker Creek, and by a party from Idaho which discovered Reynolds and Jordan Creek. During this time but little work, permanent in its character, was done, miners being generally on the hunt for strikes, or a big thing. They did not begin to look for claims yielding under eight to sixteen dollars per day per hand until about 1864. On the contrary, each miner seemed to be determined to expend his last dollar before locating. At the same time, every miner brought with him his peculiar ideas of a mining country, formed in the mines they happened to come from. We had miners from California, Australia, Cariboo, Florence, Pike's Peak and Mexico, but the surface indications here do not precisely resemble any of the above-named mining localities. A fine, rich bunch and rye-grass grows on the surface of a loamy soil, and because it was not dry and barren, as in most mining districts, the country remained almost wholly unprospected. There was another class, however, that kept at work, regardless of the surface indications in the country, and to this class is owing almost entirely the permanent settlement of these two counties as mining districts, and almost wholly without other capital than that obtained from the ground worked, they have, in eight years, demonstrated the fact that Baker and Union counties are both rich, and almost unlimited, except by their own boundaries, as to the extent of their placer mines.

The character of the mining country is this. It is covered with a fine loamy soil, and with excellent bunch and rye grass. In many places decomposed quartz, and float slate, granite and volcanic rocks appear. The general appearance would lead to the belief that the country has been under water for a long period of time, and that large streams of water have crossed the country in a different direction, from that in which they now run. In many places heavy deposits or channels of washed gravel have been found. The country is broken up in gulches, flats and hills, fronting on and leading into and surrounding the main large valleys that lie on the present main streams of water. In other words, the mines are confined to the table lands, and foot-hills of the mountains. The depth of the mining lands runs from almost bare bed-rock to sixty and more feet deep: and to work it with profit, water is required for ground sluicing and hydraulic mining. In many places the ground is sufficiently rich to pay working in rockers. The entire country, up to this time, has been almost wholly dependent on snow water for mining purposes, and the country is filled in almost every district with what are here usually called dry ditches. The fall of snow is irregular, some years the dry ditches have water twenty days, other years from forty to sixty days. There are some permanent streams that furnish water sufficient for large ditches, but as these streams cut well back, and lie deep down in the mountains, long lines of ditches are required to convey them to the mines, and to build long ditches capital must be obtained. The living streams available for ditches are Burnt, Malheur, and Powder Rivers, and Eagle Creek. Among the first ditches built here, were those of Conoyer on Powder River, Davidson & Carter's and Kirkpatrick & Co's; for Auburn mines the water being taken from Elk Creek. The Griffin, Stafford and Littlefield ditch, from Elk Creek to Griffin Gulch.

W. H. Packwood, Abbott, Fuller, Ward and others organized the Auburn Water Company in 1862, about September 15th to 20th; sold in November to some Portland capitalists—Messrs. Ladd, Brooke, Thompson, Ainsworth and others, who carried the enterprise through the next year. This enterprise was one of the greatest inducements to the permanent settlement of Powder River Valley, and the capital invested by the last named gentleman is almost the only outside capital ever invested in these two counties.

Packwood, Perkins, Statesman and Kitchen built the Clark's creek ditch in spring of 1863, which ditch has been and is now a good piece of paying property. The Rye Valley ditch was built in 1864, and from time to time almost all the springs in the mountains and streams that run water while the snow lasts, have been improved for mining purposes. The main or living streams so far are idle. In 1863 W. H. Packwood, Ira Ward, Robt. Kitchen and J. N. Hull, organized the "Burnt River Ditch and Mining Company." This was an undertaking and enterprise of first magnitude, and founded more on the belief as to the general existence of paying gold mines on the Burnt River and Willow Creek mountain sides, than from any positive knowledge of their existence. In the fall of 1864 W. H. Packwood hired a party of men and sent them to prospect the Willow Creek side of the mountain. They found from a color to three bits to the pan, gold coarse order. They could find it in almost every place, in the flats, hills, and gulches, in paying quantities. In fall of 1863, A. C. Goodrich ran trial lines for a ditch. In 1864 Chas. Barrett, civil engineer, surveyed and staked the line for a ditch from Burnt River to Shasta Pass or Gap.

Now, to understand the character of the enterprise, it is necessary to know that Burnt river and Willow creek are two streams rising in a spur of the Blue Mountain, and running parallel with each other a distance of from forty to fifty miles, separated by a dividing mountain that rises in altitude from one to three thousand feet. The slopes of the divide separate Burnt river and Willow creek from each other, on an average, about fifteen miles. Now, the object of the company in selecting Shasta pass—a low gap in the main divide—was to run a line of ditch in such manner as to command both sides of the mountain. By Mr. Barrett's survey, the distance from Burnt river to Shasta pass was found to be over eighty-eight miles for line of ditch. By commanding Shasta pass as a terminal point, it was believed by the company that their line would command a larger extent of placer mines than was ever before commanded by any ditch in the history of mining in California or elsewhere. From Shasta pass, the ditch line could be extended on the Willow creek slope a distance of about thirty miles to Snake river. On the Burnt river slope, it could be prolonged sixty and more miles, Snake river being the only limit to its extension. After Mr. Barrett's survey in 1864, the Indians were hostile for over two years, so as to render life and property unsafe, and no further work was done until 1867. At this time Mr. T. J. Carter, of Portland, became interested in the company, and work was resumed in June, 1867—Mr. T. J. Carter, President, and W. H. Packwood, Secretary; capital stock, $144.000. In 1867, 1868 and 1869, the company completed nearly fifty-eight miles of the main line, commencing at Shasta pass and running to water. They expended over one hundred thousand dollars on the work of construction in that time. Their line of ditch in this fifty-eight miles took in the small streams fed by snow, and had tapped East Camp creek. In the spring of 1870, the company puddled their ditch with the snow water and Camp creek, and had water for sale for a few weeks on the Willow creek side of the mountain. The water sold by them realized an average of about 60c. per inch for ten hours' use.

In the spring of 1869, Mr. Uriah Perry, an old ditch man in California, came into this country, and having examined the mines, and knowing practically that Burnt River and Malheur were the only available living streams of water in this country, and that the placers were extensive, he projected forming a company in Iowa and Illinois for the purpose of securing the water rights and mining extensively. He enlisted Mr. J. H. Johnson, who went back to Chicago and there succeeded in inducing Mr. Buford of Rock Island, to come out and examine the country. The result was, after some weeks' examination, that Mr. Buford purchased nearly the entire stock and control of the Burnt River ditch company's property; including large tracts of mining land, on liberal terms, fair profit to seller and purchaser. Mr. Buford being a man of great wealth, proposed to double the size or capacity of the ditch constructed by Carter and Packwood. Their ditch was designed to convey and store up sufficient water to furnish about two thousand inches for ten hours. Mr. Buford's directions would require the ditch to be enlarged to about 8 ft. top, 6 ft. bottom, able to carry water 3 ft. deep. Mr. Johnson, secretary and superintendent for the company, pressed the work in good and bad weather, from Oct. 1870, to Jan. 1871, and has the ditch about completed to the size above named, or very near it. A light wagon or buggy can be driven in the ditch, and two horsemen can ride through it abreast comfortably. This company is known as the "Malheur and Burnt River Consolidated Ditch and Mining Co." Mr. Buford, Prest.; J. H. Johnson, Sec'y. Capital Stock one million dollars. Mr. Buford having secured the Malheur River water, this company now own and control all the available living water for mining purposes in these districts, to wit, Eldorado, Malheur, Amelia City, Rye Valley District, Clark's Creek and Burnt River Slope—say, at a low estimate, mining districts that together would form one district sixty miles long, by ten to twenty wide.

All the water in this district is from the snow, or natural water, and usually it only affords a supply for a small number of claims for a few weeks. This is the largest ditch in the State of Oregon, and will be one of the longest on the Pacific coast when completed as in time it will be extended sixty miles from Shasta Pass. About thirty miles more will finish the main line or trunk, and the company intend doing that work early this spring. One objection to long ditches is loss from evaporation. This line of ditch lies on the north and west side of the mountain, and has for feeders on the line not less than eighteen streams of water that run from five to 100 inches each, and should more than make good all loss by evaporation. The country through which the line runs is a favorable one for ditching, being a clay loam and slate country. The ditch, when completed for running water, may cost from two hundred and fifty to three hundred thousand dollars. Very many will say: Will the country and mines justify the investment? We have no hesitation in saying it will pay for an investment of one million dollars for water to supply the named mining districts, by the owners using even ordinary care in the management of same. Let us see: The old company sold water, first head, 30c.; 2d head, 20c.; 3d head, 10c. per inch; 4th head, 5c. Average about 60c. per inch for ten

hours. Many persons may not understand what we call in mining first, second head, etc. It is the same water first sold being sold over several times, each time for a lower price than before, as the water depreciates in value from use. In Mormon Basin, and through Mr. Kelly's Ditch at Amelia, the water of the upper camp is used in the lower, from twelve to fifteen times. The Malheur and Burnt River Ditch Company, when their works are completed, can sell, say four thousand inches for ten hours. Say that they only realize for all uses 25c. per inch (they should at a lower estimate realize 40c. to 50c., as the water will be used over three times in many places), their sales would amount to $1,000 per day. They can run and sell water from two hundred and thirty to two hundred and seventy days each year. Their current expenses should not exceed from fifteen to twenty-five thousand dollars per year, and become less, with age on the ditch. Again, the question—How long would this last? The fact is, the available supply of water for the districts named cannot equal the demand, and the water that can be obtained will not suffice to work out the mines on this line in the next one hundred years.

A few years ago, a few men believed this true; to-day thousands do. Again, independent of selling water, there are other inducements for investments in ditches which did not exist a few years ago. In this case the one company owning an absolute monopoly of the water can, if they desire, purchase at nominal prices from the United States and others large tracts of mining land, and by then conveying water so as to be available to mine their land, can raise its value immensely. Or, as in California, they can construct large flumes and hydraulics, mine extensively with large streams of water, so as to make the water save the labor of men.

Chinamen are in the country and can be hired cheaply, or ground could be rented to them with water to work it. The monopoly a ditch company has here gives them as absolute a right to tax the mines in some form or other, as the Government has to tax the people. Another thing is this, poor and rich land can be worked now at same time. In earlier days, only the rich land could be worked, in consequence of high prices. Now, however, a man can live quite cheaply, labor can be had for $2 50 to $4 00 per day, where in past years it was from $5 00 to $8 00. Hence when water can be obtained, every class of mines can be worked; for it is a truth that miners will mine ground for less than wages, and take the chance of more than wages. The gold dust in Eldorado, Malheur, Amelia, Clark's Creek and Burnt River Slope is worth from sixteen to eighteen dollars per ounce.

The largest piece ever found in Baker county was at Gimletville, a small camp on Burnt River. It was worth nearly four thousand dollars. Chinamen have both bought claims at nominal prices, and have paid as high as thirty-five thousand dollars for them. The completion of the Malheur and Burnt River ditch will give steady and permanent employment to a large number of miners, and add to, and stimulate, the agricultural and grazing interests of Baker and Union counties.

Following down Burnt River from the mouth of Clark's Creek to Snake River, a distance of fifty miles, the river cuts through the mountain range that runs northward and parallel with Snake River. So far as the river has been tried, on the bars and hills, on and near the river, gold has been found in paying quantities. In fact, from one to fifty dollars per day have been made with the rocker. From Clark's Creek to Express Ranch, for twelve miles the river forms a Canyon. In places hundreds of feet above the river, bars and hills are found that would pay largely with water for hydraulics and flumes. Some of these hills and bars have been drifted and worked in rockers, and good returns made in that manner; but as the gold is not confined to the bed-rock, but found in all the dirt, in some locations twenty to sixty feet deep, no very profitable w rk can be done without an abundance of water and flumes. There is also every reason to believe that the bed of the river is rich for at least twelve miles in this canyon. To open and work the bed of the stream, large flumes and derricks would be required to operate successfully.

But few miners have singly or in the aggregate money to invest in carrying on an enterprise of this character, and before they would consolidate themselves for an enterprise of this or any other kind requiring heavy outlay, they must first exhaust the more-easily accessible placers, on the same principle precisely that the shallow placers were nearly or quite worked out before the hills were opened in California. The hills and bars in the canyon can never be worked until the Malheur and Burnt River Ditch Co. convey water to work them. A number of low-line ditches are taken out and in course of construction on Burnt River below Express Ranch. These low-line ditches are principally built by the miners, small in size, not high enough for hydraulic mining, and seldom exceed from one to three miles in length. However, there is a Ditch Company incorporated, with a large capital stock, in Chicago, Mr. W. P. Richmond, President; Mr. McHenry, Secretary; and Mr. Donnell, Superintendent. Their object is to construct one or more large ditches from the vicinity of Express Ranch, or mouth of the canyon just named above the ranch, and convey the water down over the bars and foothills for sale and to mine their own land. This company would have a line of ditch that would command a large tract of valuable land for hydraulic and ground-sluicing, and their line of ditches would, or can be, extended to cover good mining land to Snake River—say forty miles.

Mr. C. W. Durkee, of Express Ranch, has also commenced a line of ditch out of Burnt River, that would be some two hundred feet higher on the hills than Mr. Richmond's line of ditch. Both ditches would be nearly the same length, command the same country, with this exception, Mr. Durkee's being highest on the mountain, would command a large tract of mining land lying between the two ditches. Towering high on the mountain above all these lines of ditches, will come in time a branch ditch from the Shasta Pass, owned by the Malheur and Burnt River Ditch and Mining Co., that will lie on the mountain side a thousand feet higher than any other ditch can ever go; and yet high above this line lie Sutherland's mines, where with snow water in the spring for from four to six weeks, men make what would be in the older States good pay for a year's labor. Higher still is the far-famed Mormon Basin, situated on the summit of the mountain and near the center of all the camps named. Few camps have been found richer than Mormon Basin. I am reliably informed that one thousand buckets of dirt have yielded as high as one thousand dollars, in rocking. As the supply of water in the basin is very limited, the mining population has seldom exceeded from three to five hundred persons.

There are a number of small ditches on South Powder river, which enable from three to five hundred Chinamen to make a living at mining. Messrs. McCrary, Tracy, Ingraham and others own a number of small ditches on Rock creek and North Powder. Some of them are five miles long. They command an extensive hydraulic and ground-sluicing district, that pays from two to ten dollars per day to the man, with good water privileges. In the foothills near Pochahontas a number of good claims have been found, the gold being very coarse. One piece found last summer was worth $247. Salmon creek, in same district, is opened in several places, and found good. Distant about thirty miles north of Burnt river country, lies what are called the Eagle creek mines, in Union county. The range and character of gold is the same as in the Burnt river country. The Eagle creek mines have been worked with rockers for some years, and a very large amount of money taken from them in that way; now there is a ditch under construction to supply the wants of that country. The following, from the *Bedrock Democrat* of Baker City, gives the latest information on the subject of these mines:

"EAGLE CREEK AND ITS PROSPECTS.—For some time past we have heard it rumored that the construction of a large ditch in what is known as the Eagle Creek country was contemplated. We are now able to state that the waters of Eagle Creek have been secured, and that C. M. Foster, United States Surveyor of Mining Lands in Eastern Oregon has run trial-lines, and surveyed and staked out over sixteen miles of the main line of the ditch. It will be about twenty-two miles in length, and is intended to have a capacity large enough, with the aid of reservoirs, to run and sell three thousand inches of water in the Shanghai, Rooster and Powder River Slope mining districts. Work on the ditch will be commenced as early as April—if the weather permit, in March next. Mr. George Carter is now looking for a good site on which to cut the flume lumber, and intends to be ready for operations by the first of April—the amount of lumber being about three hundred thousand feet. It is the intention of those engaged in the enterprise to have a ditch completed and conveying water between the first of August and September. The principal part of the work on the ditch will be let to two Chinamen—one of Baker City and the other of Auburn; who will put on between two and three hundred Chinamen, and finish the ditch, with ease, by the time the flumes can be built. The projectors of the work, we are assured, have perfected the financial arrangements, and will safely carry the enterprise through to completion.

"Messrs. Bowen & Cranston, of this place, are going over to select a place for a store, which will probably form a nucleus for a town in that section of the country. They will take a number-one selected stock, full and complete in every department required in a new mining country. Both having had large experience as pioneer merchants of Auburn, Idaho and Clark's Creek, they are certainly well qualified for such an undertaking. They design being ready for trade, in the new location, by or before the first of next April. C. M. Foster has surveyed a number of mineral land claims in that country, under the United States Mineral Land Act—the size of them all they way from ten to eighty acres. Quite a number of claims, from ten to forty acres, have been located by some of our pioneer miners from Auburn—among them are George Slocum, D. Moore C. E. Smith and Judge White. The Eagle Creek country, through portions of which this ditch will be constructed, is known to be very rich in auriferous deposits; it is also extensive. In gulch, creek, flat and hill are paying gold mines, and all now wanted is a good supply of water. When that is secured, the Eagle Creek country will be second to none for mining purposes; and it will be equal to any camp in Oregon. It is well known here who are the projectors of this enterprise; but as Portland and Eastern parties desire an interest, the matter of incorporation will be postponed, but the work will be prosecuted without delay at the time specified. The Eagle Creek enterprise and mines are in Union county, and are destined to add largely to the wealth and population of that county. Union and Baker are the richest counties in Oregon in mineral resources."

W. H. Packwood and Alex. Stewart are the projectors of this enterprise. The cost of the ditch will be not less than one hundred thousand dollars with reservoirs. They have a never failing stream of water from 1,500 to 2,000 inches (miner's measure) as a source of supply. After building about eleven miles their sales of water will amount to from fifty to one hundred dollars daily. They can sell all their water from two to five times and realize from 30 to 40 cents per inch, and it is not unreasonable to believe from what is known of the extent and character of the country that this line of ditch will repay the entire outlay in dividends in one year from its completion. A town named Sparta has been laid off in that vicinity, and buildings are being erected for stores, etc., at this time, and numbers are preparing to build.

From the article in the *Democrat* you will see that miners are locating mining lands in this district under the United States mineral land act. This is the first land ever located in Oregon in that way—so far as we can learn. All mining lands have been owned by squatter, or possessory title character heretofore. In consequence of the manner of holding under the old style men have been very reserved in the matter of even taking up, or investing money in mining lands, unless actually prepared to occupy and work the same. Representation is ever a prominent feature in the mines, and if a man has invested thousands of dollars in land and fails to represent it properly, he forfeits all title if any one should step in and represent the land.

Representing varies in different localities. Some camps require twenty-five dollars in labor in the year, on or for each claim owned—water or no water. Some require representing each year about the time water is expected, and if no water can be obtained for mining, notices are to be renewed on boundaries, and claims laid by. All claims require representation by actual labor on an average one day in seven when water can be obtained.

Now under such circumstances it is not a cause for surprise, that outside land—or land on which water can only be obtained at great expense—should remain unlocated or investments made to bring it into market when the title to it, could only be of a possessory character, entailing through representation each year, for each claim owned from three to four times the Government price for same. This United States law will create a revolution in title, and by doing that representation, as now practiced, will cease. While it is true that this law may induce larger investments in mining lands than heretofore—in some cases to the injury of the poor man, it is believed by many (aside from being a source of Revenue to the Government) that an absolute security of title will induce investments of capital to improve, bring water, erect hydraulics, construct flumes, etc., on a large portion of our mineral lands that poor men could not now or hereafter operate. Should such be the result, as we are inclined to believe that it will be, it will even, while making the rich richer, benefit the laboring man, and the country more than under the present practice, as then thousands can be employed in fields created solely by the aid of capital.

The yearly gold product of our mines cannot have been less than from one to one and one half million dollars from 1863 to 1870. The gold has been, we may say, the sole product of labor. The number of miners has varied from one to three thousand—averaging for several years about fifteen hundred. The average mining season has not been three months per year. With the amount of water that can be obtained by means of the ditches now contemplated, our mining population and gold product should be from three to five times greater than heretofore.

So far we have no more than cracked the shell of our mines, the core and heart still lying in the hills, and old river channels, and we have only been slowly but surely developing this fact. In the Blue Mountains, on the head of Grand Ronde River, good land has been found, and indications of extensive hill mines. Good copper and coal have been found in Union and Baker counties on Snake River. T. J. Carter, W. H. Packwood and Isaac and John Garrison expended several thousand dollars in prospecting for coal on Snake River. Sufficient work was done to show the existence of good coal deposits of a bituminous character, but, as there was no demand except for blacksmiths' use, it would not pay them to continue work.

Our quartz interests are in their infancy. So far, the Rockyfellow lode has been worked more than any other vein or lode in Baker or Union counties. This lode has been worked for the past five years, paying, we are informed, well and regularly. The present owners, Messrs. Brown & Virtue, are down about four hundred feet, have a well-defined lode from twenty to thirty inches wide. The quartz yields them from forty to sixty dollars per ton. The gold is worth nineteen dollars and fifty cents per ounce. The owners have a ten-stamp mill at Baker City, obtain their power to drive the mill from a ditch from Powder River. The lode is situated about seven miles from Baker on the divide between Powder and Burnt Rivers. This lode has yielded thousands of tons of good rock, and from present indications is inexhaustible, and the mine probably contains wealth sufficient to pay for working for ages to come. E. M. White, at Auburn, is down over one hundred and ten feet, on what there is every reason to believe is a true vein. The vein is almost perpendicular, with well-defined wall rock. The rock contains fine gold. The vein is from six to thirty inches wide, and improves as they go down. Mr. White intends soon commencing a tunnel, calculated to tap the lode about two hundred feet below the surface. He has taken out in sinking his shaft, almost beyond doubt, quartz sufficient to pay for erecting a mill, which he intends doing this summer. The rock has been worked in an arrastra and yielded nearly ninety dollars per ton. Quite a number of other ledges have been found in the same vicinity. Up on South Powder a number of fine ledges have been found.

Near Pocahontas, a ten-stamp mill is now being erected by Messrs. Olds & McMurran, and is to do custom work. Water, for milling, and wood for steam, are abundant, and cheap living can be had, as Pochontas is situated in the edge of one of the best farming districts in Eastern Oregon. Quartz is abundant in the foothills and mountains back of Pocahontas. Many lodes are partially opened. Some have been worked with an arrastra, some with hand mortars, and the results are extremely favorable. In fact, the rock was so well known that I understand that Messrs. Olds & McMurran have more than rock sufficient engaged for crushing from responsible parties to pay the entire cost of erecting a mill. The Young America is about four feet. A tunnel is being run, to strike it deep down in the hill. The Gunboat is near two feet wide thirty feet down, and the rock is, without doubt, extremely rich. On Salmon Creek, in same vicinity, a ledge has been found recently, that twelve feet down is nearly four feet wide, and from which we have seen as rich rock as we ever saw from California. In Rye Valley, a large number of ledges have been found in which silver predominates. So far, no capital has been invested to develop them. At Hagern, Union county, a small mill is owned by George Carter and others, in connection with a number of ledges. On one ledge they are down about one hundred and thirty feet with a tunnel. The vein is in places as much as thirty inches wide. Rock is abundant. All the rock pays for milling, and in some places he has found rock that milled about five hundred dollars per ton. There are a large number of ledges found in that country that prospect well.

As I said before, no capital has been invested in Baker and Union counties for the purpose of developing mining interests, except the amount named from Portland. Our placer and hill mines and quartz are of such a character as to require capital and labor united to develop them properly. When developed, as they will be sooner or later, they will be found to contain unbounded mineral wealth, and to be as certain, safe and reliable counties, for good paying returns on investments of that character, as can be found from Colorado to the Pacific coast. The population of Union and Baker counties has probably never exceeded 12 000 persons, and has not, we think, been less than 8,000 since 1862. The climate of the country is healthy, equal to any part of the Pacific coast. Both counties have extensive farming land and grazing country almost unequalled, and in fact not surpassed in Oregon or California. Both counties have been wholly dependent on Portland for merchandise, but the completion of the Union and Central Pacific Railroads have given Portland competitors for our trade in the enterprising merchants of Chicago.

Last fall a Chicago merchant shipped a fair stock of merchandise to Eldorado, and we learn he is so well satisfied with his venture, that next spring he will ship a large stock to Eldorado, via Kelton and Boise City. This competition will be of great benefit to the people of Baker and Union counties. Portland having had a monopoly of our trade, we have been taxed as high, and higher on an average, for merchandise than the same sold in Idaho, from one to three hundred miles further inland than we were from Portland. We trust our Senators and Representatives may induce Congress to pass a bill for a railroad to connect the Columbia River and Central Pacific or Union Railroads, such as to ensure its early building. Such a road would naturally and necessarily run very near the centre of both counties, and would, by giving means of transportation for our products, lead to the settlement of millions of acres of land valuable for farming and grazing purposes. With such road completed, we do not know of any part of the Pacific coast that would offer better inducements to the emigrant for permanent homes than in these two counties. Nor do we believe that, with railroad facilities, any two counties in the great basin from the Rocky Mountains to the Sierras or Cascades, offer to the capitalist mining investments of a more permanent character, on which certain, safe and speedy returns can be expected. From 1862 to 1871, our imports have been paid in gold from our mines; with increased facilities for transportation, we could pay in wool, flour, bacon, butter, cheese, beef, and many other articles of produce that now depend solely on the mines for a market. The gold yield should not be one million, but from three to five million dollars yearly from these two counties, and from agricultural and grazing products a like sum. The same may be said of Umatilla and Wasco counties as to health, grazing and farming, but their mineral resources are limited. These five counties, Baker, Uni Grant, Umatilla and Wasco, embrace what is known as Easte Oregon, an area of country equal in extent to many of our lar States.

MARKET REVIEW.

The Coal Trade.

NEW YORK, Feb. ,24 1871.

WHOLESALE.—The stock of coal on hand in this market has been reduced to about 10,000 tons. Amid the excitement provoked by exaggerated reports published by the daily papers, prices are everything and anything. Without being able to find that any bona-fide sales have been made, we quote Lump, Broken and Egg $12; Stove $13 to $14; Chestnut $10. This state of affairs we pointed out to our readers as likely to happen, several weeks since, and as far as we can see to-day, there is no immediate relief to be expected from any quarter. The large companies, heavy operators, and transportation companies held an adjourned meeting in Philadelphia yesterday, at the office of the Philadelphia and Reading R R. Company, at which, after a free discussion on the subject in question, the following resolutions were adopted:

Resolved 1. That the Schuylkill region offer to the men of their district for the year 1871, $2 50, the basis as agreed upon in November last, sliding up and down at the rate of one per cent advance and decline upon wages and contract work for every three cents per ton advance and decline in the price for coal at Port Carbon; *provided* that men shall not be paid at a higher rate than, under this basis, they would be entitled to when coal is $3 per ton at Port Carbon until the regions go to work.

2. That the Lehigh region offers to their men the following rate for the year 1871: When coal is $5 per ton on board at Elizabethport or Port Johnson, the outside wages to be from $9 to $10 50; inside wages from $ 1 to $12; miners' wages, $14; and contract work, 10 per cent. less than at the five-dollar basis of last year, with an advance or decline of 12½ per cent. on wages and contract work for every dollar in advance or decline in the price of coal at Elizabethport or Port Johnson, provided that, until all regions go to work, no higher rate of wages for contract work shall be paid than the men would be entitled to receive upon the new basis, when coal is $6 per ton on board at Elizabethport or Port Johnson.

3. That the Delaware and Hudson Canal Company; the Delaware, Lackawanna and Western Company; and the Pennsylvania Coal Company combine their present offer with a right to modify it from time to time, so as to make wages paid by them as nearly equivalent as practicable to what might for the time being be paid in the Schuylkill and Lehigh regions.

4. That any region may go to work upon the above terms being accepted by their men, but that no region shall commence until the men of such region shall have accepted the said terms.

5. That we are united in opposing any interference by workmen or their association with the management and control of our works, and will insist upon the abandonment of their claims to such control.

It remains now to be seen whether the Miners' and Laborers' Association will allow their members to resume work upon the above indicated terms. We question very much that they will, the proviso being in all cases too strong for the digestion of the Union. It is, however, a step toward arbitration, and may lead to something better in a couple of weeks. In the meantime we must call upon our readers to keep cool and not get excited. If you run out of Anthracite Coal, supply yourself with a small quantity of Cumberland Coal, which can be purchased for about $8.00 per ton. Educate your customers in its use, and although it will not answer in all cases, yet in many it will give a good turn.

We cannot advise parties to buy at present rates, not that we consider them entirely unwarranted, but the risk run is too great. Any day may bring a telegram of the resuming of operations in one section or another, in which case the bottom will entirely fall out of the market. Take care that you are not the one caught. As a substitute for Coal during the present high prices, Coke can be obtained from the gas works and retailed. Also oak wood would be cheaper to use than coal at $15 and $18 per ton.

Anthracite Coal Trade for 1870 and 1871.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending Feb. 18, 1871, compared with week ending Feb. 19, 1870.

COMPANIES.	1870. WEEK.	1870. TOTAL.	1871. WEEK.	1871. TOTAL.
*Phila & Reading R.R	51,5.6	468.271	9,162	51 .478
†Schuylkill Canal	...	34 .73	..	36 225
Lehigh Valley R. R.	49,814	526.5-5	2.910	338,026
Lehigh & Sus. R. R.	13,029	121,.69	650	57,761
†Lehigh Canal	...	...	....	.....
Scranton North	11.976	84.812	....	.....
" South	35. 29	212.239	.. :	.....
Penn. Coal Co., rail	20 .338	120,5.2	....	2,760
" " " canal	...	...	....	.....
Del. & Hud. Canal Co..	...	...	....	.....
" " East	6.727	72 757	....	48,332
" " West	2,2.5	13,383	....	12,721
South	1.093	17 .75	..	.....
Shamokin	7, 81	38,079	6,283	39,441
Trevorton	491	2,.94	..	.....
Lykens Valley Coal Co.	821	4,08	314	10,046
Wyoming South	....	....	....	....
Wyoming North	...	...	....	....
P. N. Y. C. & R. R. Co.	5.61	46,557	....	....
Williamstown, Cel'y.	5,111	23,207	....	....
Big Lick Col	....	....	1,227	12,387
Total	211,919	1,786 .39	20,546	1,198,177
1870	20,546	1,198.177		
Increase week and yes	191 372	587,562		

*Less coal transported for Company's use and Bituminous coal.
†Closed for the season.

Bituminous Coal Trade, 1870 and 1871.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Feb. 18, 1871, compared with week ending Feb. 19, 1870.

COMPANIES.	1870. Week.	1870. Year.	1871. Week.	1871. Year.
B. & O. R. R.	9,365	68,606		69,874
C. & O. Canal				
H & B. T. R. R.	5.974	24.414	5,021	29,661
Harrisburg & D.	7,299	68,758	8,235	54,639
L. V. R. R.		2,559	2,845	5,484
P. & N.Y. C. & R. Co.	3,543	37,457		30 084

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, February 18, 1871.

BY RAILROAD—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB VAL. BRANCH.

	Tons. Cwt
From St. Clair	443 17
" Port Carbon	341 18
" Pottsville	344 18
" Schuylkill Haven	668 02
" Pine Grove	1,144 09
" Tamaqua	5,601 14
" Harrisburg	23 02
" Dauphin	1,262 17
Total	9,448 19

SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD.

Passing Locust Gap	742 18
" Shamokin	2.699 02
" Herndon	
Total	3,442 00

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	635 02
" Lebnaon & Pine Grove Branch	283 06
Total	918 08

CONSUMED ON LATERALS.

From Frackville Scales	
" Mill Creek "	106 06
" Schuylkill Valley Scales	74. 13
" Mt Carbon "	242 16
" Cressona "	69 10
" Pine Grove "	41 00
" Tamaqua "	100 01
" Shamokin "	
" Treverton "	
Total	1,306 06

LEHIGH AND WYOMING COAL.

Received via Allentown, E Penn's Br.	37 12
" " Alburtis, " "	
" " Plymouth R. R., G. & N. Br.	
" " Connecting R. R. "	
" " Willow Street R. R.	
Total	37 12

BITUMINOUS.

From Harrisburg	6,973 02
" Connecting R. R., G. & N. Br.	
" Junction R. R.	212 09
Total	7,185 08

COAL FOR COMPANY'S USE.

Anthracite	491 17
Bituminous	961 18
Total	1,452 15

RECAPITULATION.

	Total for Week.	Corresponding week last Year.	Increase.
Passing over Main Line and Leb. Val Branch	9,448 19	52,933 11	
For shipment by Canal	—	—	
Shipped Westward via Northern Central R R.	3,442 00	3,671 06	
Shipped West or South from Pine Grove	918 00	426 03	492 05
Consumed on Laterals	1,306 06	2,2 7 10	
Lehigh and Wyoming Coal	37 12	136 14	
Total Anthracite paying fr'gt	15,153 05	59.425 04	
Bituminous	7,185 08	6,692 18	492 10
Total of all kinds paying fr'gt	22,338 13	66,118 02	
Coal for Company's use	1,452 15	2,211 15	
Total Tonnage for Week	23 791 06	68,329 17	
Since Dec. 1, 1870	612,127 02	610,788 06	1,338 16
Total to date	635.9 8 10	679,118 03	

SHIPPED BY CANAL.

	Total for Week.	Corresponding week last Year.	Increase.
From Schuylkill Haven	—	—	—
" Port Clinton	—	—	—
Total Tonnage per Week	—	—	—
Since Dec. 1, 1870	—	—	—
Total to date	36.225 17	34,373 16	1,852 01

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railrodad, Saturday, Feb. 18, 1871;

From St Clair	443 17
" Port Carbon	341 18
" Pottsville	668 02
" Schuylkill Haven	2,066 00
" Port Clinton	5,6 1 14
" Allentown and Alburtis	37 12
" Harrisburg and Dauphin	8,235 19
Total paying freight	17,3.5 02
Coal for Com.any's use	1,452 07
Total for week	18 850 09
Previously this year	507.281 15
Total	526,132 04
To same time last year	574,238 18

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending February 18, 1871—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1871. tons cwt.	WEEK 1870. tons cwt.	YEAR, 1871 tons cwt.	YEAR 1870. tons cwt.
Wyoming Region	383 0.	11492 02	39576 04	91083 00
Upper Lehigh Region		592 12	4614 06	4851 03
Mahanoy Region		261 05	704 05	814 16
Hazleton Region			1043 03	
Beaver Meadow Region	373 18	1462 00	15864 02	29925 13
Pleasant Mount Region				
Mauch Chunk Region				
Totals	757 04	14197 19	61802 00	126671 12
Increase				
Decrease	13440 15		64869 12	
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	650 17	13029 18	57761 05	121069 04
Forwarded East of Mch Chunk by Canal				
Delivered at and above Mauch Chunk	106 07	697 06	4040 15	4284 10
Delivered to L. & B. R. at Plymouth Bridge		470 15		1317 18
L. V. R. R. at Sugar N.				
Totals	757 04	14197 19	61802 00	126671 12
Of the above there was transported on acc't of L. C. & N. Co.	373 18	2770 14	17100 09	38598 01
W.-B. C. & I. Co.		4790 06	30858 18	39146 14
Totals		7561 00	47959 07	74744 15
Increase				
Decrease	7187 02		26785 08	

Delaware and Hudson Canal Company.

The following is a statement of Coal transported by the Delaware and Hudson Canal Co., for the week ending February 18, 1871.

	WEEK.	SEASON.
By Del. and Hud. Canal		48,332 00
By Railroad East		12,721 00
" West		
" South		
TOTAL TONS		61,053 00
For the same period last year.		
By Del. and Hud. Canal		
By Railroad East	6,727 00	72,757 00
" West	2,255 00	13,383 00
" South	1,095 00	17,575 00
TOTAL TONS	10,077 00	103,715 00

Pennsylvania Coal Company,

Shipments of Pittston Coal for the week ending February 18, 1871.

	1871. WEEK.	1871. YEAR.	1870. WEEK.	1870. YEAR.
By Railway	— —	2,760 14	23,338 11	120,553 19
" Canal	— —	— —	— —	—
Total	6? 05	2,760 14	20,338 11	120,553 19

Decrease 117,792 05 tons.

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending February 18, 1871, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt
Total Wyoming	701 19	67,208 16
" Hazleton	62 19	20..2-4 14
" Upper Lehigh		442 06
" Beaver Meadow	1,115 08	66,811 00
" Mahanoy	1,7-4 19	55 1 10
" Mauch Chunk	11 04	1,127 00
Total Anthracite	3,653 11	396,125 06
Bituminous Coal from all sources	2,845 00	5,484 00
Total by rail and canal	6,570 11	401,679 06
Same time last year	57,563 19	502,814 10
Increase		
Decrease	51,063 08	101,205 04
Forwarded East from M'h Chunk by rail	2,910 18	338,026 17
Same time last year	49,814 13	526,565 04
Increase		
Decrease	46,903 15	188,538 07

RECAPITULATION.

Forwarded East from M'h Chunk by rail	2,910 18	338,026 17
To N. C. R. R., at Mount Carmel		18 00
Forwarded North from L. & B. Junction	247 17	33,072 02
To L. & S. R. R. at Packerton for rail	39 17	1,876 19
Delivered at M'h Chunk		323 03
Delivered on line of road above Mauch Chunk	11 07	
	10 00	2,620 00
Delivered above M. Chunk for use of L. V. R. R.	336 12	10,601 14
To L. & S. R. R., at P'n Hav., for railroad		94 10
Do. for canal		7,060 19
At M. Chunk for canal		2,4.1 02
Total Anthracite	3 6'5 11	396,124 06
Bituminous Coal	2,845 00	5,4 4 00
Total all kinds	6,500 11	401,609 06

Report of Coal forwarded by Pa. & N. Y. R. R. Co., for week ending February 18, 1871.

	WEEK. Tons.	WEEK. Cwt.	YEAR. Tons.	YEAR. Cwt.
By Rail	3,147	..	....	..
Previously this year	39,931	10	....	..
Total by Rail	43,078	10	....	
By canal	....	..	....	..
Previously this year	....	..	....	..
Total by Canal	....	..	....	..
Total for the year	43,078	10	....	..
To the same time last year	37,457	..	....	..
Increase	5,621	10	....	..

Company Coals.

February, 1871.

No quotations during strike.

	L.	Str.	Gra.	Eg.	Sto.	Ches
Scranton at E. Port	—	—	—	—	—	—
Pittston at Weehawken	—	—	—	—	—	—
Lackawana at do	—	—	—	—	—	—
Wilk'b're at Hoboken	—	—	—	—	—	—
Old Co. Lehigh at Pt. Johnston	—	—	—	—	—	—
Lehigh at E. Port	—	—	—	—	—	—

For freights to different points, see "Freights."

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, February 18. R. A.	W. A.	AT PHILADELPHIA. February 17. R. A.	W. A.
Lump	$— —	$— —	— —	— —
Steamer	— —	— —	— —	— —
Broken	— —	— —	— —	— to —
Egg	— to —	— to —	— —	— to —
Stove	— to —	— —	— —	— to —
Chestnut	— to —	— —	— —	— to —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	— —	— —	— —	— —
Broken	— —	— —	— —	— —
Egg	— —	— —	— —	— —
Stove	— —	— —	— —	— —
Chestnut	— —	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.	8 00	— —	— —
New England	"	— —	— —	— —
Locust Dale	W. A.	7 50	— —	— —
Honey Brook, Le'h	W. A.	7 50 to 8 50	— —	— —
Spring Mountain	"	7 50 to 8 50	— —	— —
Sugar Creek	"	7 50 to 8 50	— —	— —
Sugar Loaf	"	7 50 to 8 50	— —	— —
Old Comp'y's	"	7 50 to 8 50	— —	— —
Cross Creek	"	7 50 to 8 50	— —	— —
Room Run	"	— —	— —	— —
Girardville	"	— —	— —	4 75
McMichael	"	— —	— —	4 75
Shamokin	"	7 50	5 25	— —
Lykens Valley	"	— —	5 75	— —
Broad Top	"	7 50	— —	— —
Hill & Harris	"	— —	4 75	— —
Henry Clay	"	— —	5 00	— —
Powelton	"	7 50	— —	4 75

[*Dealers in these coals may be found in our advertising columns.]

Prices for Coal at Mauch Chunk.

February 1871.

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein f.o.b. at Phila	$5 00
Lemon " "	4 75
Cumberland Vein Coal " "	4 75
Consolidation Coal Co.'s on board N. Y.	7 00
Maryland Coal Co. " "	7 00

Prices at Baltimore—February, 1871.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 80@—
Pittston and Plymouth, do	5 60@5 75
Shamokin Red or White Ash, do	—@6 00
Lykens Valley Red Ash, do	5 25@—
Zerba Valley	5 25@—
Treverton	6 00@—
By retail, all kinds per ton of 2240 lbs	7 25@8 25
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 60@4 75
Fairmont and Clarksburg gas, f. o. b. at L. Point	6 00@6 50

Prices at George't'n, D.C., & Alexandria, Va.

February, 1871.

George's Creek and Cumberland f. o. b. for shipping $4 40

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@5 50
Lykens Valley	— —@6 25
Shamokin Red or White Ash	— —@5 75
Treverton and Zerba Valley	— —@6 00

Prices of Gas Coals.

February, 1871.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 41-43 Pine st., N.Y. Duty, $1 25, gold.

	Coarse.	Slack.
Block House	$1 75 @— 75	
Glowrie	1 75 @— 75	

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse	Culm of Coal.
Picton	$2 25	@1 25
Sydney	2 25	@— 80
Lingan	1 75	@— 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Currency.
Westmoreland	7 75 @8 00
Fairmount Gas Coal Co. of N. Y.	7 50 @— —
Deepard Coal Co	$7 50 @— —
Penn	7 75 @8 00
Newburg Orrel Gas	— — @— —
West Fairmount Gs Coal	8 00 @— —

AT PHILADELPHIA.

Powelton	$7 8

Prices of Foreign Coals.

February, 1871.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street New York.

Liverpool Gas Caking	$ 9 00@— —
" " Cannel	11 50@12 50
" House "	—@16 00
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel	18 00@20 00

Per ton 2,000 lbs. delivered.

Foreign and Provincial Freights.

February, 1871.

Closed for the winter.

Foreign.	
Newcastle and Ports on Tyne, per keel of 21 1-5 tons	£14 00@£16 00
Liverpool, 5 per cent primage	13s @16. ton
TO NEW YORK.	
Provincial	
Sidney	$ —
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—
TO BOSTON.	
Sydney	$ —
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—

Rates of Transportation to Tide Water.

Closed for the Season.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon $2 00

Less drawback of 50 cents on all Coal shipped east of New Brunswick and south of Cape Henry.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 84
C. R. R., N. J., Easton to Elizabethport	1 21
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 40

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R from M. C. to Easton	$ 84
C. R. R., of N. J., Easton to Pt. Johnson	1 24
Shipping expenses	25
Warfage	10
Total	$2 40

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 84
Morris & Essex R. R. Easton to Hoboken	1 56
Shipping expenses	25
Warfage	10
Total	$2 55

TO SOUTH AMBOY.

L. V. R. & S. & D. R. R.	84
Cam. & Am. R. R.	1 14
Shipping Expenses	25
Total	$2 23

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	84
C. RR. of N. J. Easton to Elizabethport	1 21
Shipping expenses	25
Wharfage	10
Total	$2 40

Freights.—February, 1871.

TO EASTERN PORTS.	From Philada'a.	From E. Port and Port Johnston.	From Roxbury	From Rondout
Amesbury	$2 50	$2 00		
Bangor	2 30	1 60		
Bath	2 30	1 75		
Boston	2 0	1 65		
Bridgeport	1 75	1 00		
Bristol	2 00	1 40		
Cambridgeport	2 75	2 00		
Derby	2 00	1 20		
Dighton	2 30	— —		
East Cambridge	2 50	2 00		
Fall River	2 50	1 40		
Hackensack	1 75	1 00		
Hartford	2 50	1 50		
Jersey City	1 40	60		
Middletown	2 25	1 25		
Mystic	— —	1 25		
New Bedford	2 00	1 40		
Newburyport	2 65	1 85		
New Haven	1 90	1 00		
New London	1 76	1 25		
Newport	2 00	1 40		
New York	1 35	60		
Norwalk	1 80	1 00		
Norwich	2 00	1 30		
Pawtucket	2 30	1 50		
Portland	2 30	1 50		
Portsmouth, N. H.	1 45	1 85		
Providence	2 00	1 25		
Rockport	2 10	1 65		
Saco	2 25	1 75		
Sag Harbor	1 70	1 20		
Salem	2 25	1 65		
Stamford	2 00	1 00		
Stonington	2 00	1 30		
Taunton	2 30	1 75		
Warren	1	1 40		
Washington	1 25			
TO RIVER PORTS.				
Albany				
Catskill				
Cocksackie				
Coeyman's				
Cold Spring				
Fishkill				
Haverstraw				
Hudson				
New York				
Nyack				
Poughkeepsie				
Rhinebeck				
Rondout				
Saugerties				
Sing Sing				
Stuyvesant				
Tarrytown				
Troy				
West Point				
Yonkers				

METALS.

NEW YORK, February 25, 1871.

IRON.—Duty: Bars, 1 to 1½ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1½ to 1¾ cents ℔ lb: Pig, 7 ℔ ton; Polished Sheet, 3cents ℔ lb; Galvanized 2½; Scrap Cast, $5; Wrought, 8 per ton.

	Store Prices.
Pig, Scotch No. 1, ℔ ton	29 00@33 00
Pig, American, No. 1	30 00@— —
Pig, American, No. 2	28 00@29 00
Pig, American, Forge	27 00@28 00
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	$5 00@100 00

	Store Prices, Cash
Bar, Swedes, ord'y sizes, less 5 ₱ ct.	— @110 50
Bar, Refined, " "	74 00@ 79 —
Bar, Common " "	70 00@ — —
Scroll " "	97 50@125 —
Ovals and half-round " "	97 50@125 —
Band " "	92 50@ 95 00
Horse Shoe " "	95 —@ — —
Rods, ⅜ to 3-16 inch " "	82 50@ — —
Hoop " "	102 50@140 00
Nail rod	— —@6¾ —
Sheet, Russia, as to Nos. (gold)	10¼@—11
Sheet, Single, D. and T. Common	—4½@— 6
Sheet, Galv'd, Nos. 14 to 26 10 and 12 do. Nos. 27, 28, and 29, 13@14	
Rails, English (gold), ₱ ton	56 00 @58 00
Rails, American, at Works in Pa.	70 00 @72 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ₱ lb; over 11 cents, 3½ cents ₱ lb. and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ₱ lb	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11½@— 14
English German (2d and 1st quality)	— 13 @— 15
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— 16 @— 17
American, Spring, do.	— 9 @— 11
American Machinery, do.	— — @— 12
American German, do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₱ lb	— @— 30
Copper Bolts	— @— 32
Copper Braziers, 16oz. and over	— @— 32
Copper Nails	— @— 37
Copper, Old Sheathing, &c., clean	19 @— 20
Copper, Chili Pig	@—
Copper, American Ingot	22 @— 22¼
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb; Pipe and sheet, 2½ cents ₱ lb.

Galena, ₱ 100 lbs	$— — @— —
Spanish (gold)	6 20 @6 25
German, do.	6 21 @6 25
English, do.	6 20 @6 50
Bar (net)	— — @8 75
Pipe (net)	— — @10 25
Sheet	— — @10 25
Colwell, Shaw & Willard Tin-Lined Pipe 15 cts. ₱ lb.	

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val. Plate and Sheets and Terne Plates, 25 ₱ cent.; Roofing 25 ad val.

	Gold ₱ lb.
Banca	39 @—
Straits	33¾@33¼
English	— @33

PLATES. Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ₱ box	$8 75 @9 00	$10 00 @10 50
I. C. Coke	7 37½@7 75	8 37½@ 8 75
Coke Terne	6 25 @7 25	7 00 @ 8 00
Charcoal Terne	7 75 @8 25	8 75 @ 9 50

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₱ lb.

	Gold.
Plates, Foreign ₱ 100 lbs.	$5 87 @ 12½
Plates, Domestic ₱ lb.	8¼ 11½

The Slate Trade.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	$6 50@ 7 00
" green, 1st " "	6 50@ 7 00
" red, 1st " "	15 00@16 00
" variegated, "	5 75@ 6 20
b'k and d'k blue, 1st qual., "	6 00@ 7 05

PENNSYLVANIA SLATE TRADE.

SHIPMENTS OF SLATE OVER THE LEHIGH VALLEY, AND LEHIGH AND SUSQUEHANNA R. R., AND THE LEHIGH CANAL:

For the week ending February 18, 1871.

LEHIGH VALLEY R. R.

ROOFING SLATE.

Girard Slate Co.	— squares
Jones & Williams	— "
Jones & Town	— "
D. Williams & Co.	— "
Saylor & Morgan	— "
H. Williams	35 "
Lehigh Slate Co	— "
American Slate Co.	— "
Hope	— "
Keystone	— "
Locke	— "
J. Anthony	— "
Kuntz & Woodning	— "
Columbia	35 "
Total	70 "

SCHOOL SLATES.

D. Williams	48 cases.
Lehigh Slate Co.	47 "
Locke Slate Co.	33 "
A. W. Lerch	— "
H. W. Harper	— "
Total	128 "

BLACK BOARDS.

Yerkes & Martin	— "
Lehigh Slate Co	2 "
Total	2

MANTELS.

Yerkes & Martin	24 "
Lehigh Slate Co.	19 "
Total	43 "

LEHIGH AND SUSQUEHANNA R. R.

Eagle Slate Company	82 "
Heimbach	35 "
Continental	35 "

SCHOOL SLATE.

A. W. Lerch	25 cases.

The San Francisco *Bulletin*, February 10, has the following financial intelligence in regard to the dividends of mining companies:

Chollar-Potosi Mining Co.	$10 ₱ share	280,000
Eureka (Cal.) Mining Co.	10 ₱ share	40,000
Golden Chariot (Idaho) M. C.	4 ₱ share	40,000
Hale & Norcross Mining Co.	5 ₱ share	40,000
Meadow Valley Mining Co.	1 ₱ share	60,000
North Star (Cal.) Mining Co.	3 ₱ share	9,000
Sierra Nevada Mining Co.	1 ₱ share	20,000
Yellow Jacket Mining Co.	2 ₱ share	48,000
Black Diamond Coal Co	½ ₱ share	25,000
Union Pacific Salt Co.	¼ ₱ share	2 250

In addition to a regular $5 dividend, the Chollar-Potosi Mining Company paid $5 extra. The same company will do the same thing this month.

The Sierra Nevada Mining Company paid their first dividend on the new issue. The Golden Chariot Mining Company paid nothing in December, and hence they were able to pay $4 in January. The North Star Mining Company paid only $2 in December. The dividend of the Yellow Jacket Mining Company is the first paid by that incorporation since March 15, 1869. The disbursements of the mining companies, for the month of January, were $537,000 against $135,400 during the same month in 1870. The large increase in mining disbursements is note-worthy, mostly due to the Chollar-Potosi Company, which paid $280,000 last month, against $28,000 for the same month last year.

The Cherokee Flat Blue Gravel Mining Company have levied an assessment of $5 per share, delinquent March 10th.

The January receipts from the Ely and Raymond mine will aggregate $38,000. From twenty-five to thirty stamps can be employed on first-class ore.

The Confidence Mining Company have levied an assessment of $3 per share, delinquent March 13th. This is the ninth assessment levied by the Company. No dividends have been paid.

An assessment of $2 50 per share was levied on the 31st January on the stock of the Ida Elmore Mining Company, delinquent March 3d.

During the past week, 1,584 tons ore were taken from the Chollar-Potosi mine, averaging $69 10 ₱ ton. Receipts for January, $236,605.

A clean up of 100 tons ore at the Buckeye mine averaged $21 75 per ton.

The last weekly report of the Savage mine shows 1268 tons ore extracted, averaging $31 12 per ton.

The X. Y. Z. mine at Eureka, has been sold by B. F. Bivins to the South Eureka Mining Company of San Francisco, who are at present working the claim. Four men are employed. There is a breast of 10 feet of fine ore in the drift, from which 75 tons of ore are taken out weekly. Some of the ore assays $80 per ton. More men will be employed, and drifting and sinking in another direction commenced.

JOHN GRAY has been appointed Superintendent of the Original Hidden Treasure mine.

An assessment of $10 per share was yesterday levied on the stock of the Imperial Mining Company, delinquent at the office on the 7th March.

The January receipts of the Golden Chariot mine foot up $123,696.

Gold Production of California and Australia.

THE similarity of mining operations in the Australian colonies to those of California, both in respect to origin and progress, is remarkable. Gold was discovered here in 1848, and there in 1851. From the 10th of June to the end of December, 1851, the quantity of gold obtained in Victoria—the first six months after its discovery—was 243,414 ounces. During 1852 the miners secured 2,218,783 ounces of gold, valued at $44,375,640; and in the year 1856 the quantity obtained was 2,985,991 ounces, amounting to $59,719,820. This was the largest yield of any one year in the history of the Victoria gold fields. The decline in production commenced the following year—1857—and continued each year till 1868, when there was an increase of 233,811 ounces over that of 1867.

The result of mining operations in 1868 was 1,657,498 ounces, valued at $33,149,960. The total quantity of gold received in Victoria from 1851 to 1868—18 years—was 35,568,450 ounces, valued at $711,369,000.

As it will be interesting to many of our readers to know the total productions of gold in the Australian colonies and the neighboring colony of New Zealand, compared with California, we give the latest official and reliable returns as follows:

	Ounces.	Value.
Victoria, 1851 to 1868	35,568,450	$711,369,000
N. S. Wales, 1851 to 1867	7,929,688	148,314,125
Queensland, 1860 to 1867	128,711	2,424,850
	43,626,849	$862,107,975
New Zealand, 1853 to 1867,	3,746,214	74,924,280
Total from 1851 to 1868	47,373,063	$937,032,255

It will not be necessary to give a detailed statement of the yearly exports from California. The amount of gold and silver bullion shipped from San Francisco in certain years was as follows:

In 1859	$47,624,193
In 1861	40,639,089
In 1864	55,203,423
In 1869	37,287,117
In 1870	about 35,000,000

The actual production of all the mines west of the Rocky mountains can hardly be less than $60,000,000 per annum, and the statistics published from year to year since the discovery of gold in 1848—now about twenty-two years—prove that over $1,200,000,000 of treasure has been exported. If we deduct from this sum the average of three years, so as to bring the returns to correspond with the returns from Australia since gold was discovered there—say $171,428,580—we shall have $1,028,571,420, to compare with the results of the Australian and New Zealand mines—$937,062,255. This gives a difference of $91,539,165 in favor of California and the Pacific Coast mines as the result of eighteen years of development. These estimates are only approximate values, but they are as nearly correct as it is practicable to give them. They show a remarkable similarity in the grand total of the mining interests of the two countries, so near of an age, and so similar in their rise and progress.

From 1855 to 1868 the Government of Victoria paid $76,955 as rewards for the discovery of paying gold fields. And from 1851 to 1868 it received in revenue from the gold fields alone, for miners' licenses, miners' rights, business licenses, escort fees, export duty, leases of gold and mineral lands, etc., the sum of $26,057,325.

The quantity of gold obtained in Victoria from 1864 to 1868, 5 years, from quartz veins and alluvial workings, was as follows:

From quartz veins.....2,622,856 ounces.
From alluvial diggings.....5,036,018 "

Showing in favor of alluvial diggings, 2,413,162 onnces in five years.

In the seven leading mining districts of Victoria, viz.: Ballarat, Beckworth, Sandhurst, Maryborough, Castlemain, Ararat and Gippsland, there are 2,431 miles of water races, constructed at a cost of $1,551,350. The area of land held as claims in the same districts is 133,575 acres. And the estimated value of the claims in these seven districts is $44,347,520. The number of machines employed in alluvial mining are 441 steam engines; 1887 pumping machines; 298 whims; 320 whips; 261 cradles; 19,346 water-wheels; 643 stamps crushing cement. And the number employed in quartz mining are, 602 steam engines; 66 crushing machines; 5,997 stamps; 512 whims; 436 whips. And the value of all the mining plant in Victoria is estimated at $10,752,160.

The number of men engaged in mining in Victoria in 1851 was 19,300. The largest number in 1860, 108,562; and the number in 1868 was 64,658.

In 1857 there were 36,327 Chinamen working at the mines in Victoria. In 1868 the number was reduced to 15,300. The remainder have nearly all returned to their native land. Only 56 of the 15,300 are working at the quartz mines; the balance are working on the alluvial mines.

The number of gold mining companies is 2,471; the number of shares in these companies is 7,421,492; and the nominal capital is $122,156,025. The average yield of quartz is only about 11 dwts. 12.37 grains to the ton. This is a small yield compared with California and the Pacific coast.

In 1852 the average earnings of miners were $1310; in 1862 it fell to $336; in 1868 the average rose to $520 per man per annum. This will give our readers a bird's-eye view of the mining operations of the Australian colonies, with which we are coming into such close commercial intercourse by means of the line of mail steamers; and as soon as this line is put on a permanent and satisfactory basis, our intimacy is likely to grow still more sapidly and extensively.

Stamps on Mining Deeds.

UNITED STATES INTERNAL REVENUE,
Supervisor's Office, California, Nevada, Utah and Arizona.

SAN FRANCISCO, January 31, 1871.

The attention of all interested is hereby especially called to the stamping of deeds in cases where several individuals owning undivided interests in a mining claim incorporate, and to convey to such incorporation thus formed their said interests, receiving stock therefor. The question as to the amount of stamps required under the law, having been referred by me to the Department, Hon. Commissioner PLEASONTON writes me, under date of January 18, 1871, that such deeds "fall within the rule contained in paragraph 7, part 14, of series 5, number 10," laws and regulations Internal Revenue Department, and further, "that stamping the deeds under the said rule the market value of the stock should be taken as a consideration, without regard to the par value of the same." In cases where the market value of the stock cannot otherwise be determined, the actual value of the property conveyed must necessarily be taken as a basis upon which to determine the market value of said stock, and such deeds must be stamped accordingly, with a fifty cent stamp where the consideration is $500 or less, and fifty cents for each additional $500 or fractional part thereof. Internal Revenue officers in California, Nevada, Utah and Arizona have been and are hereby specially instructed that the penalties prescribed by law must be enforced in all cases of violation in the above mentioned particulars hereafter occurring.

Very respectfully,
L. M. FOULKE, Supervisor.

Charcoal from Slabs and Edgings.

IN this country of sawmills, and with the iron mines for our next neighbors, the question is constantly being discussed as to the practicability of smelting ore with charcoal made from slabs and other mill refuse. The amount of this waste among the fifty or more mills along the Bay shore can scarcely be calculated. It is immense, and a no inconsiderable item in the running expenses of a mill is that of getting rid of that refuse, by burning or other means. If it can be used for smelting ore, two great ends will be gained—obtaining the fuel at merely the cost of moving it, and getting rid of the slabs, etc., at a profit instead of a loss.

Upon this subject the Menominee *Herald* has an article, discussing the question affirmatively, and printing a letter from H. J. COLWELL, Superintendent of the Michigan Iron Company, at Clarksburgh, L. S., where the problem has been solved. Mr. C. says: "We have made charcoal from the slab arising from the manufacture of lumber, and can confidently say that good soft coal can be made from them when proper care and attention is taken in charring. We make coal from soft wood of several kinds, and consider the coal made from pine slabs not only equal but in some respects superior to that made from other kinds of soft wood, it being less liable to crumble and waste, as is generally the case with coal made from soft wood. It would be necessary to be informed as to the quantity of offal at command to form a correct estimate as to the practicability of erecting a blast furnace for the reduction of iron ores at that point (Menominee). When we consider a furnace to be in operation ten months in each year, and consuming two thousand (2000) bushels of charcoal per diem, it will impart some idea of the amount of wood required to maintain such an enterprise in successful operation through the above specified time. But to be more definite, and that I may be the better understood upon this point, I give you the figures as they occur to me after due consideration of the subject and its surroundings:

Quantity soft coal used per diem	2,000 bushels
Number days in operation per annum,	300
Total quantity of soft coal	600,000 bush.
No. bushels coal per cord soft wood	30
Total cords soft wood required	20,000

"It will be observed by the foregoing statement that the quantity of pine slabs required to keep a furnace in operation for one year will be 2000 cords. Should the mills in your place be equal to the estimate, and the offal procured at reasonable rates, there is no doubt but that a furnace could be made to return good results upon the investment."

Economy in Blast Furnaces.

MM. GRUNER and LAN, in their *Etat présent de la métallurgie du fer en Angleterre* (Paris, 1862), attribute the saving of fuel in the working of the blast furnace during the last ten or twenty years, more to the increase of the size of the furnaces than to any other cause. Mr. SCHINZ agrees with these authors and attributes to this augmentation the deterioration in the quality of the products, and believes that the ironmasters of Staffordshire adhere to the blast furnaces of the old forms and dimensions rather to maintain the good quality of their products than through fear of altering these dimensions. He further says: "But this saving is caused by the less transmission of large furnaces which renders the consumption of less carbon necessary for attaining the same temperature; this smaller quantity of carbon gives, however, also less carbonic oxide to the shaft, and the reduction of the ores is less perfect, whence direct reduction by means of solid carbon takes place, the result being that the products will contain more silicon. The practical result of these observations is that all means which increase the temperature in the working part of the furnace should be avoided, but the highest possible temperature should be maintained in the upper parts of the shaft, this being effected not only by diminishing the transmission, but also by increasing the quantity of the heat and the richness of the reducing gases, so as to obtain a maximum of production without deteriorating its quality.

DEPARTMENT OF PUBLIC WORKS,
No. 237 BROADWAY.

TO CONTRACTORS.

Proposals inclosed in a sealed envelope, with the title of the work and the name of the bidder indorsed thereon, will be received at this office until TUESDAY, March 7, at 11 o'clock, A. M.

For paving Twenty-second street, from Fourth avenue to Broadway, with Belgian pavement.

Blank forms of proposals, the specifications and agreements, the proper envelopes in which to inclose the bids, and any further information desired, can be had on application to the Contract Clerk at this office.

WILLIAM M. TWEED,
Commissioner of Public Works.

New York, February 24, 1871.

J. THOULET & C. RASCHER, MINING AND CIVIL Engineers, Maps, Topographical and Mining Surveys, Superintendence of Mines, Metallurgical and Chemical Works, Examinations and Reports on Coal and Metallic Mines, Assays, etc., Oriental building, 122 La Salle street.

MAGIC LANTERNS FOR SUNDAY Schools, Academies, Public Exhibitions, and Parlor Entertainments. Illustrated priced catalogues sent free. T. H. McALLISTER, Optician,
Dec. 21:6m. 49 Nassau street, N.Y.

The Titaniferous Iron Mines of North Carolina.

TO THE EDITOR: SIR—As much interest seems to be manifested on the subject of the Titaniferous Magnetic Iron Ores of North Carolina, by reason of the developments recently made, I think it may be interesting to give you the facts as I have been able to gather them during my visit to that region. Commencing at a point in Rockingham county, near the Richmond and Danville railroad, about 18 miles northeast of Greensboro, the Iron Range runs southwest through the counties of Rockingham, Guilford, Forsythe, and into Davidson, a distance of about 35 miles. The outcrop, which is very heavy, is contained within a belt of from 200 yards to 400 yards in width. There appear to be at least three veins of iron within the belt which frequently appear boldly on the surface. The ore is of two kinds, that of some of the veins being compact, but grained in appearance, while other veins are rather conchoidal in fracture; both, however, are easily mined with pick and wedges. The North Carolina Centre Iron Company, of Philadelphia, for the most part own or control this mineral range. The president of the company handed me the following analyses of Professors GENTH and FESQUIT:

GENTH.

Magnetic oxide of iron	79.78	
Oxide of manganese	0.28	
Chromic oxide (trace vanadium)	0.32	
Titanic acid	12.08	Metallic iron.....57.77
Silicic acid	0.75	
Alumina	4.62	
Magnesia	2.04	
Lime	0.13	
	100.00	

FESQUIT

Metallic iron	60.41
Titanic acid	8.65
Silica	1.50
Sesquioxide of chromium	.83
Sesquioxide of manganese	0.12
Magnesia	2.02
Lime	0.75
Alumina	2.90
Sulphur	0.00
Phosphorus	mere trace.

The company have erected a Bloomery at a point about 12 miles west of Greensboro, near the line of the Northwest North Carolina Railroad, and are prospecting other more extensive works, and are also locating shafts at different points, intending to ship iron ore to the North for puddling and blast furnace uses. The metal has been manufactured into steel for rail, tool and cutlery purposes, by different establishments in the North as I am told, with excellent results. Owing to the extraordinary decomposition of the feldspathic and gneissoid rocks, much difficulty has been experienced in securely locating the shafts in the rocks. The mine visited by me is situated about the centre of the range. The shaft is 100 feet deep, from the bottom of which a drift is run 55 feet south, at which distance a vein of ore was reached and proved to be 7½ feet in thickness, but they had not yet cut through the other veins of the formation. The country is heavily timbered with oak. The Dan River coal field runs parallel with the iron range at a distance of 15 miles north. The Germantown limestone ridges are 18 miles northwest from the works of the company. I was also shown at the company's office specimens of magnetic ore, said to assay 55a60 per cent. metallic iron, which, however, was not titaniferous, but free from sulphur or phosphorus, and which made a very soft and malleable metal. I was very much interested in the examination of this titaniferous mineral property, and if the quality of the iron for steel manufacture is equal to its extent, I cannot but consider that its development at this time is a matter of great interest and importance.

Yours, very truly, J. D. SERGHANT.

—[*U. S. R. R. and Mining Register.*

Deep Placer Mining in California.

[Continuation.]

IMPROVEMENTS IN HYDRAULIC MINING.

HYDRAULIC mining has made such rapid strides on the road of progress, and assumed such monster proportions in the past year or two, that now the vast magnitude of its operations serves to almost totally eclipse every other branch of mining industry. The principal cause of this success, and the energy displayed by miners of this class, is attributable to the recent improvements made in apparatus or machinery, long needed which would enable the miner to use a heavy, perpendicular pressure with safety and economy, and at the same time place it within the power of a single operator to concentrate in one stream and effectually control a large body of water.

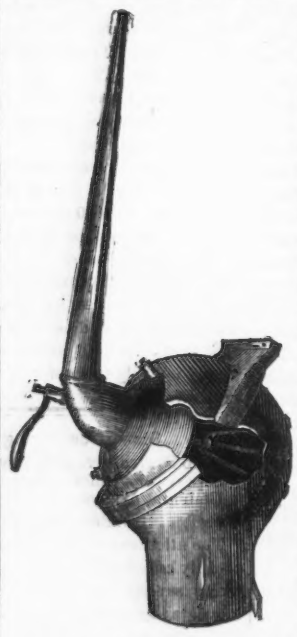
To fully understand the extent of these improvements, it will be necessary to state a few facts in relation to the primitive or old-fashioned method of conducting this work, and trace it step by step to its present perfect condition. First we will speak of the object to be accomplished, which is to confine a body of water, in a compact, continuous stream to a certain point of egress, whence it will pass, with more or less force, in an almost solid column. This force will, of course, be governed by the relative height the entering head of water may be above the discharge-pipe or nozzle.

The stream so obtained is used to undermine banks or walls of auriferous dirt and cemented gravel deposits, and the greater the height or elevation at the point of supply, the greater will be the force and quantity of the water discharged; and the more those two powers (fall and quantity) are concentrated, the greater the amount of earth that will be torn down and removed, resulting in a proportionately larger yield of the precious metals. Having thus described the object, we will now speak of the apparatus used for bringing about these results.

CANVAS hose was first brought into general use in 1853, and as the larger proportion of the mines worked at that time were quite shallow, and the dirt as a general thing soft, it was found to answer so well that several years elapsed before an effort was made to improve on it. Canvas hose is constructed about six inches in diameter, of very strong sail-cloth; will bear with safety from eighty to one hundred feet pressure, and discharge effectually a stream of water one and three-fourths or two inches in diameter. The material, however, which is composed of cotton, is very expensive, and rots rapidly, while at the same time it is ever liable to burst by the weight of water, and thus become a complete loss to the miner.

As the development of gravel deposits progressed, it was found that the materials of a large proportion of our richest mines were very difficult to disintegrate. These consist of a species of cement, and went to prove that greater fall or pressure was needed to enable the water to undermine and break up the gravel; and as canvas hose could not bear the necessary pressure, a substitute was found in sheet-iron pipe. This is constructed of various dimensions, from six to forty inches in diameter; but in order to obtain a flexible discharge piece, it was necessary to retain a short piece of canvas hose, and in order to make it safe, it had to be covered or bound up by a netting or cover of strong rope, which was both expensive and inconvenient. These difficulties combined, succeeded in arousing the inventive ingenuity of the miners, and resulted in bringing to light the inventions known as the "Improved Hydraulic Nozzles," the first of which was invented by the Messrs. CRAIG, of Nevada county—a county which has had the honor of inaugurating all the improvements in this branch of mining. These improved nozzles proved a complete substitute for canvas hose, and by their simplicity of construction, cheapness and durability, met with an immediate, rapid and extensive adoption by the miners throughout the State. This has enabled them to use with safety sufficient fall to work the hardest dirt or gravel rapidly and cheaply, and at the same time to use a pipe of any size required, so as to run all their water in one stream, which alone nearly doubles its effectiveness, and besides places it under the control of a single operator. They gain in force saving manual labor and economising in every way.

Craig's Globe Monitor or Globe Hydraulic Nozzle.—This invention consists of a hollow ball or globe, with an opening at one side, into which enters the main feed or supply pipe, and one on top, out of which protrudes an elbow joint. One end of this elbow is attached to a socket, which revolves on the interior of the globe, and at the same time creates a water-tight joint; this joint enables the operator to change the direction of the stream from point to point at pleasure. To the other end of the elbow is attached the discharge-pipe, which may be of any size desired. The ball revolves entirely round horizontally, and up or down, at an angle of about forty degrees. This play has been found amply sufficient for all ordinary mining purposes, and causes a perfect stream to emerge at any point to which the nozzle may be directed.



As a matter of economy, it not only places the water of seven or eight ordinary hose-pipes under the control of one man, but its durability is so great (one lasting a lifetime) that its extra first cost is seldom noticed, it being in convenience alone worth more to the miner than the difference of cost of canvas hose. No canvas being used, it is not liable to breakage under heavy pressure, and saves the annual outlay for canvas, while the concentration of a larger body of water in one column has been found to nearly double the amount of execution in comparison with ordinary expenses. The proprietors, Messrs. R. R. & J. CRAIG, of Nevada City, manufacture four different sizes, the largest of which will run some 1500 inches water, "miners' measure." The Messrs. CRAIG have three U. S. patents upon the monitor and its improvements, and deserve great credit for developing so valuable an auxiliary to our mining industry.

F. H. Fisher's Knuckle Joint and Nozzle.—This machine consists of two elbows, placed in reversed position when standing in right line, but made to revolve by a ring in which there is a series of anti-friction rolls, the ring being slipped down over the top of the lower elbow and then held in its place by a flange, bolted to the top of the lower elbow. The ring is then bolted to a flange on the top elbow, thereby connecting the two together and at the same time leaving the top elbow free to move around in a complete circle. When the water is let into the elbow the pressure brings the rolls up in the ring against the flange on top of the bottom elbow, allowing the top elbow to move around easily and without any friction except that of the rolls themselves. A piece of rubber packing placed between the flanges of bottom and top elbows, makes the joint tight by the pressure of the water against the ring. In the outlet or top elbow is a knuckle joint which gives the up and down motion to the discharge pipe. It is a concave surface fitted to a convex one; the concave has an opening for the pipe to pass through. The pipe is screwed into the convex surface and will move up and down while the concave one is bolted firmly to the flange on the top elbow. The elbow and knuckle joint are made of cast iron from ⅜ to ½ inches thick. The discharge pipe is made of No. 16 iron, 8 feet long with cast iron nozzle. The machine is operated by a lever 10 or 12 feet long with two arms, and attached to top elbow by trunions. A lever is pivoted to the top of the upper elbow and attached on one end to the discharge pipe by a strap inclosing the pipe and provided with two rolls on top for the lever to slip on. At the other end it is connected with the operating lever by a short upright lever made to work loose in its joints. Thus the up and down motion is imparted to the discharge pipe by the rise and fall of the operating lever By moving it to the right or left the whole machine except the bottom elbow is moved. A little device is attached to the lever to hold the discharge pipe in position when the water is off. It is a catch working in a ratchet on the top elbow, attached by a rod running out on the lever so that the operator can put it in or out as the case may be. The pipe stands firmly in place when the water is on; the operator standing at the end of the lever can easily direct the stream to any point—good execution being done at a distance of two hundred feet from the bank, thus securing safety of life from caves which are of so frequent occurrence and often fatal where small streams are used against high banks. These machines are made to throw streams of from 4 to 7 inches in diameter, and were invented by a citizen of Nevada county, Mr. F. H. FISHER. W. A. S.

On a Blow-Pipe Assay With the Automatic Air-Blast.

By LE ROY C. COOLEY, Ph. D.

THE blow-pipe furnishes an easy means of detecting the presence of precious metals; but, for reasons shortly to appear, its use has been, for the most part, limited to this purpose, and the furnace has been resorted to whenever a determination of the value of the ore has been desired. The simplicity and elegance of the blow-pipe assay have, however, prompted many attempts to make this instrument take the place of the furnace. Systems of quantitative analysis, with it, have been devised by PLATTNER and others, which, in the hands of skilful operators, do, doubtless, give satisfactory results, but they have never become popular with assayers. The objections to these methods do not spring from any want of confidence in the chemical actions involved—these are satisfactory—nor do they arise from the amount of labor required, for this is less than that of the furnace assay. The objection to the use of the blow-pipe in determining the value of ores springs from the necessity of using such small quantities of ore that the silver button obtained is too minute to be satisfactorily valued. Rarely will this button be large enough to be weighed; its value is sought by measuring its diameter and comparing it, with that of another button whose value is known, on the principle that spheres are to each other as the cubes of their diameters. Delicate and ingenious scales have been devised for this purpose. But even if we allow that these minute diameters are, in any case, measured with sufficient accuracy, yet there still remains the fact that the little buttons can never be exact spheres, and it may well be doubted whether they ought to be considered as being truly similar solids.

If, then, the blow-pipe is ever to rival the furnace in assaying the ores of the precious metals, the first thing to be secured is the ability to operate with it upon larger quantities of material. For this purpose a larger flame must be obtained, and this necessity requires that the lips of the assayer be relieved from the fatigue of furnishing the air-blast. An automatic source of air is indispensable. If, however, the proper proportions of air and gas be furnished, it is no more difficult to produce a very large flame with oxidizing and reducing power, at will, than it is to obtain the ordinary blow-pipe flame possessing these powers. Such a flame once obtained, will evidently be able to bring about the proper chemical reactions in a large mass, with as much elegance and accuracy as the mouth blow-pipe flame does in the small quantity usually employed, and with much less labor on the part of the assayer.

The apparatus lately described in this *Journal* (October, 1870)—the *automatic air-blast* for laboratory purposes—furnishes exactly the kind of air-current necessary to produce the desired flame. With a Bunsen blow-pipe, provided, as it is, with an air jet in addition to the ordinary gas jet and collar of the common Bunsen burner, and with this automatic blast, gentle or strong at will, but always steady, the assayer has such complete control over the proportions of air and gas in his flame that he is able to regulate its heating, oxidizing and reducing power at his pleasure. With a flame so reliable in these respects, and at the same time so large as this one may be made, the assayer is able to scorify and cupel a quantity of ore quite as large as would be taken for the furnace assay. The ordinary scorifying dishes and cupels of the furnace assay are used, and the same proportions of assay lead and fluxes may be employed.

The heat of the flame is sufficiently intense to keep the scorifier and cupel in a glow without assistance from other sources, but if these vessels are placed over the flame of a laboratory lamp, its heat will facilitate the operation by allowing the energies of the blow-pipe to be directed more exclusively to the chemical actions which it is required to produce. Moreover, if the supply of water and gas is abundant, a blow-pipe with two or three jets can, doubtless, be made and fed, whereby as many assays may be simultaneously conducted.

That the accuracy of this blow-pipe assay is quite equal to to that of the furnace assay, has been found by repeated comparison of results obtained from the same ore by the two methods. Indeed, the accuracy, neatness and simplicity of the method, together with the cheapness of the apparatus required, seem to justify this public description, and the hope that it will not be entirely unwelcome.—*Journal of the Franklin Institute.*

THE ENGINEERING AND MINING JOURNAL.

CONTENTS FOR THIS WEEK.

[*Illustrated Articles are marked with an asterisk.*]

* Direct Pressure Steam Pump 129	Deep Placer Mining in California 136
Important Mining Decision..... 130	On a Blow-pipe Assay with the Automatic Air-blast..... 136
A New Process for Refining Cast Iron 130	EDITORIALS :
Transportation of Coal on English Railways..... 131	The Alta California again..... 137
Engineering Progress in India.. 131	Arizona..... 137
Test for Hyposulphite of Soda.. 132	Roasting Sulphurets..... 137
A New System of Railway Signals 132	The Atlantic Cables..... 137
MINING SUMMARY.....132-133	Smelting in South America 137
MARKET REVIEW..... 134	Petroleum Wells in Hanover, Germany..... 137
THE SLATE TRADE..... 135	Polytechnic Club of the American Institute..... 138
Charcoal from Slabs and Edgings..... 135	New Methods of obtaining High Temperatures..... 138
Stamps on Mining Deeds..... 135	OFFICIAL LIST OF PATENTS..... 139
Economy in Blast Furnaces..... 135	Coal and Limestone..... 140
Gold production of California & Australia..... 135	Business and Personal..... 140
The Titaniferous Iron Mines of North Carolina..... 136	Important to Inventors..... 140
	Advertisements 141

ROSSITER W. RAYMOND, Ph. D., Editor.

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

SUBSCRIPTION—*$4 per annum in advance; $2 25 or Six Months.*

ADVERTISEMENTS.—*The rates are as follows: Inside pages, 25 cents per line each insertion; the outside or last page, 40 cents per line. Payment required in advance.*

NEWS-DEALERS *will be supplied through the agency of the* AMERICAN NEWS COMPANY, *No. 121 Nassau street, New York City.*

COMMUNICATIONS *of all kinds should be addressed to the Publishers. The safest method of transmitting moneys is by checks, or Post-office orders, made payable to their order.*

Correspondence and general communications of a character suited to the objects of THE ENGINEERING AND MINING JOURNAL *will always be welcome.*

The Postage on THE ENGINEERING AND MINING JOURNAL *is twenty cents a year, payable quarterly, in advance, at the office where received.*

WESTERN & COMPANY,

Publishers,

37 PARK ROW,

P O. Box. 5969. NEW YORK CITY

The Alta California Again.

WE have probably posted our readers sufficiently on the discussion between this Journal and the *Alta California*. The *Alta* of February 9th adds nothing to the facts in the case. It pronounces our article "incoherent," but answers none of the questions we put to it. We now recapitulate the matter, we trust for the last time.

The *Alta* charged the Commissioner with under estimating the gold-product of California, and adduced the receipts at San Francisco for the whole coast as evidence of the fact. The figures for the coast amounted, according to the *Alta*, to some $30,000,000. This the *Alta* acknowledged to be the production of the Coast, but not of the State.

But in the same article, (Nov. 5th) *it figured up the gold product of the whole country at some* $50,000,000, and added :

"OF WHICH AT SAN FRANCISCO, $30,207,730. THUS, INSTEAD OF CALIFORNIA HAVING LESS THAN ONE-THIRD, IT HAS THREE-FIFTHS OF THE GOLD."

This sentence the *Alta* now finds it convenient to forget. No wonder. It is the vital blunder of its position. Let us give the figures of the *Alta*.

"The same data which we have here applied to the bullion receipts of San Francisco, if applied to the whole Union, show that the aggregate production of gold is $50,487,513, as follows :

Deposited at Mint (official).....	$21,824,767
Exported as bars.....	28,662,872
Total gold product.....	$50,487,513

The mistakes in these three lines are three ; the amount of deposits is not correctly given ; the amount of exports is not correctly given ; and if they were both correct, their sum would not represent the total gold product of the country. We are prepared to prove all these propositions ; but we desire first to know whether the *Alta* adheres to its statements. If it abandons them, there is no need of further discussion. But when we ask (as we did January 31st) whether the *Alta* still makes the assertion quoted, it replies (Feb. 9th) that our request is incoherent, and proceeds to re-hash the whole controversy, *omitting* the essential paragraph.

We shall now assume that the *Alta* abandons this position, unless it shall hereafter distinctly reassert it. We assume that it does not any longer claim for California a product of $50,000,000 ; and we would like to know how much it does claim. Our estimate of $22,000,000 corresponds with the product for the whole coast very well. The receipts at San Francisco, which the *Alta* parades as decisive, are published in the very report it condemns, and confirm the general correctness of the estimates for different States and Territories sending bullion to San Francisco.

Having abandoned its only positive statement as to the product of California, the *Alta* dare not venture upon another, and the correctness of our position is vindicated.

One other matter requires explanation. Some weeks ago, Mr. RAYMOND wrote to the San Francisco *Bulletin*, asking that journal to publish our article in reply to the *Alta*, because the *Alta* has republished nothing, and quoted nothing fairly. Of course the readers of the *Alta* see but one side of the question. The *Bulletin* declined to publish the article, having "an aversion to mixing in a controversy which we (it) did not originate." We stand abashed before the sensitive delicacy of San Francisco editorial scissors ! But the *Bulletin* inferred from Mr. RAYMOND's letter what was not the case, namely, that the Commissioner had been denied access to the *Alta's* columns, and thus cut off from a reply. In fact, Mr. RAYMOND is no more excluded from the columns of the *Alta* than any other person who doesn't wish to enter them. The controversy of this journal with the *Alta* is purely editorial ; and the fact that one editor keeps calling the other one by name is merely a breach of manners, which doesn't alter the case.

The Commissioner personally takes sufficient interest in the matter to desire that the people of San Francisco shall hear both sides. As appearances now are, they will be obliged to subscribe to the *Engineering and Mining Journal*, which is all the better for us. As for writing explanations and defences to the *Alta*, Mr. RAYMOND must decline that unfruitful labor ; and the *Alta* must give up the attempt to obtain correct statistics by publishing the wrong figures at hap-hazard, and then waiting for somebody to furnish better. That is a slow and roundabout way ; and sometimes (as in the present case) the party waited for declines to give his services. A better way is to pay a capable man to manage the statistical department of the paper. Then it will not publish on the 9th of November, for instance, figures which it is afraid to repeat on the 9th of February.

Arizona.

WE are gratified to see better times dawning for this hitherto much abused Territory. Simultaneously with the passage of the South Pacific Railroad bill by the House, important news of rich mineral discoveries reach us from different parts of Arizona. The construction of the South Pacific Railroad in the shape fixed by the charter as amended, i. e., as a trunk line only, will, we trust, be commenced immediately from its eastern and western ends.

The difficulties to be encountered on its western end are not extraordinary. A few hours' talk with Col. THOS. S. SEDGWICK, at San Diego, and an examination of the maps which he had just finished after completing extensive surveys across the Sierra Nevada, between San Diego and the Colorado Desert, have satisfied us, that even the most difficult portions of this part of the road can be overcome with a maximum grade of 100 feet per mile. The highest elevation reached here will be only 3850 feet, the road entering the mountains from the east by the great Carizo ravine and crossing them by the Jacumba Pass ; and the whole length of the difficult portion being less than 70 miles. The section of the road between the Sierra Nevada and the Colorado river is a level plain and only 85 miles long ; and the Colorado river is at the point of crossing at Fort Yuma only 400 feet wide. The line of the road from Fort Yuma to the eastern line of Arizona lies through an almost level country, following entirely the fertile valley of the Gila river. It will be seen from the foregoing that no very formidable obstacles are presented by nature on the western portion of the line, and if the financial management of the company designing to build the road is as satisfactory as the natural line of the road, the locomotive may traverse Arizona in less than two years.

The benefits that such a consummation will confer on the mines of Arizona and the stimulus it will impart to the development of her vast and various mineral resources, are incalculable. Arizona has, more than any other territory, suffered from high transportation and the savage Apache. But with the completion of the western end of the South Pacific road these evils will be remedied. The influx of miners and farmers sure to follow the completion of the road will do more to subdue or drive out the Apache than the whole United States army will ever be able to accomplish against such a foe.

No other country has come under our observation where minerals exist in such profusion and variety as in Arizona ; and perhaps no other region presents so many true fissure veins in the same area as do the mountain districts of that territory. Not that the minerals with which these veins are filled contain the metals in greater quantity per ton than is usual all over the world ; no miner of experience would expect this in any country, but the *amount* of metal-bearing material is enormous. Of the precious metals, gold especially is very widely distributed, while veins containing true silver ores are, according to our observations, comparatively infrequent. Argentiferous galena veins, however, are plentifully represented ; and perhaps the rarity of silver ores proper is merely due to insufficient exploration.

Indeed we are now receiving private reports from the Bradshaw mountain, hitherto known as a locality of gold only, which are unanimous in representing the late discoveries of silver leads in that district as extremely important. The "Tiger" is named as the richest vein, and it is said that fifteen dollars per foot are offered by outsiders to the original locators. When it is remembered that Arizona is at present entirely free from speculators in mines, and that all the mining in the Bradshaw region is done by hardy, industrious miners for a living, this valuation will be appreciated. Other important discoveries have been made in the Sacramento district. This district is located in the Cerbat mountains and has hitherto been favorably known as containing a great many veins of argentiferous galena and copper ores, containing silver. These ores occur in the majority of cases, in such concentrated form, that they are, without further preparation, available for either shipment or smelting. Mining was therefore resumed in the district during last summer, as soon as the conclusion of peace with the Hualpai Indians enabled white men to enter the mountains with safety. Lately, a party of officers from Fort Mohave, with several civilians, visited the district on a prospecting tour, and it is reported to us that they have discovered extraordinarily rich gold veins. They brought a ton of the ore to Mohave City, where it was tested.

The Cerbat range is one of the few among the mountain ranges near the eastern bank of the Colorado river, where water and fuel are comparatively plenty, so that even smelting works can be conducted there with profit. Moreover, the Hualpai mountains which contain an abundance of large pine, are only a short distance southeast from the mines, and timber for building purposes, as well as charcoal, can be brought from there a small cost. Adding to this the fact that the Sacramento district is located only thirty miles east of the Colorado, so that transportation to and from the mines is, even now, before the building of the South Pacific railroad, much lower than in most parts of Arizona, it is evident that the miners of this region have reason for their confidence in an early development of their mines by outside capital.

Better days are certainly in store for Arizona ; and the settlers of that Territory, who have maintained their position thus far with so much courage and persistency, and at such fearful sacrifice of life as well as comfort, will reap at last their well-deserved reward. For many of them, alas ! who sleep in bloody graves, the "good time coming" will have come too late.

Roasting Sulphurets.

DINGLER'S *Polytechnic Journal* gives a convenient method for roasting zinc-blende and other sulphurets in small quantities, which we reproduce here, since, if experience confirms the assertion of our German contemporary, the expedient proposed will prove very useful to our friends in the mining districts, who frequently have occasion to desulphurize small lots of ores, for the purpose of tests for gold and silver. The method recommended is as follows :

The sulphuret, having been reduced to powder of medium fineness, is mixed with ten per cent. of burnt gypsum to a thick paste. This is spread upon paper in cakes or disks, one-half to three-quarters of an inch in thickness and four to five inches in diameter. The disks are dried, and then subjected for some time to a red heat, in the fire of a common stove.

The effect of the gypsum or sulphate of lime is probably mechanical. At least, we imagine that its principal use is to preserve the form of the cakes, and at the same time to prevent the sintering of the sulphurets. We are not informed whether the cakes fall to pieces or crumble after complete desulphurization.

The Atlantic Cables.

FROM the latest reports we learn that the work of repairing the broken cables has again been interrupted, the steamer *Robert Lowe*, which had been engaged in these operations, having been disabled by drifting ice. It seems that the parties who first undertook the job proved entirely incompetent, and when the matter was placed in good hands the season was so far advanced that success was nearly or quite impossible. We shall therefore have to wait till spring, or perhaps summer, before either of the now broken cables can be repaired. It is to be hoped that the French cable will continue in good working order until that time, for if it should give out we would be entirely cut off from all telegraphic communication with Europe for several months.

Meanwhile, we hear from the West Indies of the failure in grappling for broken cables there, even under so experienced an engineer as Sir CHARLES BRIGHT. Altogether, the Atlantic seems to be temporarily getting the better of us. Our conquest however, is valid, though not so complete and final as we boasted ; and the rebellious sea will sooner or later be reduced again to submission, its fetters re-forged, and made strong to endure. Sir CHARLES BRIGHT and his compeers are not to be defied like CANUTE, as old NEPTUNE shall find out, to his sullen satisfaction.

Smelting in South America.

THE first reverberatory furnace built in the Argentine Republic was constructed of English bricks, but now soap-stone is used, which is obtained from the Sierra of San Luis, at a place called Pancanta. The construction of the furnace is expensive in consequence of the mode of preparing the refractory material, the want of economy in this department being most striking. Two men quarry eighty mule loads per month. Each load consists of two masses of stone, from each of which about twenty-five ordinary sized bricks are cut, and the cost of freight is about 3s. 4d. per load. Immediately they reach the furnace they are cut with hand-saws, forming bricks of nine inches by four and a half by two and a half, and each man can cut ten per day. In this way labor is wasted, and much time and money would be economized if the stones were cut and faced in large pieces at the quarry, and used thus in the construction of the furnace, would serve the same object, and avoid the expense of sawing, which is important, while completing the work in half the time.

Petroleum Wells in Hanover, Germany.

IT seems as though the petroleum industry in Germany was on the increase. With regard to the long-known deposits in Hanover, we hear that the borings undertaken in the neighborhood of Heide had for their object the determination of the extent of a layer of chalk, occurring at a depth of about 120 to 130 feet, and saturated with petroleum. In former years this chalk had been investigated to a depth of nearly 400 feet, the first 150 feet of which were found to be extremely rich in petroleum, the rest yielding various amounts. The inefficiency of the apparatus did not allow the engineer to go deeper, but at 400 feet almost pure petroleum was met. The projectors intend now to start a company with sufficient capital. Houses and machinery have been built and boring commenced, the bore to be of a diameter of 16½ inches, and to go down to a depth of 1000 feet. During the month of October, the drill struck the chalk, which resembled more pitch than chalk, which resulted, however, in pure quality after it had been subjected to distillation and burning. The petroleum chalk, which it is intended to mine by means of a shaft, will be worked into cement after extracting from it all the oil.

Polytechnic Club of the American Institute.

Meeting held at the rooms of the Association, Jan. 26, 1871. Prof. S. D. TILLMAN in the chair.

Mr. EMILE PREVOST submited the following paper :

"I beg leave to recommend to a fair trial two inventions of general interest in the matter of progress in electricity and its most economical, useful and practical applications.

"1st. The new liquid chromic acid, patented July 22d, 1870, honorably mentioned at the American Institute Fair of 1870. I would respectfully call the attention of scientific men and all others using electric batteries to the various merits of this new liquid ; its economy, strength, durability and evenness of action are unsurpassed. It supersedes nitric acid in the batteries where the latter has been employed till now. This new liquid chromic acid, that we will sell at retail at 7c. a pound, can also be used instead of the old bi-chromate of potash liquid in the batteries using one liquid, called the bi-chromate of potash batteries.

"2d. To an electro-magnet of great power, bearing a heavy weight, unsurpassed till now, and worked only by two of BUNSEN'S cups, where nitric acid is superseded by the new liquid chromic-acid.

"After fifteen years of severe labor, study and perseverance, I am now able to say that I have got a perfect knowledge of the experiments and tests made by Messrs. LENTZ, JACOBY, MULLER, DUB, NICKLES and BEEQUEREL, on the strength of electro-magnets, and I am entirely satisfied that I know the conditions to be fulfilled to obtain powerful electro magnets able to be used as motive power to machinery with decided economy, as there will be no longer any use for large sized batteries as before ; and also by the quality of my electro-magnets which I get up, such as to be fully satisfied of their molecular efficiency."

The PRESIDENT—I understand that the liquid which Mr. PREVOST has patented, and which he calls chromic acid liqnid, consists of bichromate of potash, sulphuric acid and chromic acid. He states that with two cups it will raise 1400 lbs., and that, adding another cup, it will raise 1800 lbs. With ten cups, it will raise 5000 lbs. Mr. PREVOST desires this to be discussed and to be examined by scientific men.

Dr. JEROME KIDDER—I suggest that it be tested now, and again in fifteen minutes, to ascertain the difference, and see how much it loses in fifteen minutes.

The cups were connected with the magnet, and the power shown by lifting the heavy magnet by the armature.

Mr. J. R. FISHER inquired what amount of motive power could be produced by this, and how its cost compared with that of other motors.

The PRESIDENT—The best thing that has been done heretofore with electricity has been to produce the same power with them, at twenty-five times the cost of steam. The difficulty in using electro-magnets upon a large scale has been that it is important not only to magnetize. but to demagnetize the iron. In large pieces of iron, demagnetization does not take place as readily as in small pieces. Large machines have, therefore, never been found to be as efficient, in proportion to their size, as small machines. If you take a battery of one cup and apply it to a small machine, you get a certain power. Now use fifty cups with a machine of fifty times the size, and you will not get fifty times the power. The soft iron will not demagnetize fast enough for economical use of electro-magnetism in large machines.

Mr. FISHER—How important is the purity of the iron used in making the magnet? Suppose the iron contains a considerable amount of silica, sulphur, or phosphorus, how far does that injure it?

The PRESIDENT—For the purpose of magnetization and demagnetization, it must be pure, soft iron. The process of demagnetization is just as important as that of magnetization in obtaining power for a machine.

Mr. BLANCHARD—Will the Chair inform us what was the result of Mr. PAGE'S experiments in Washington a few years ago?

The PRESIDENT—They are about as economical as any that have been made. His peculiarity was, that instead of using a series of magnets, magnetizing and demagnetizing, he simply used a piece of soft iron that entered a helix, operating reciprocally, like the piston of a steam-engine. He had a number of these, coupled together in pairs, and they were connected with a balance-wheel, so that the reciprocal motion was changed into a rotary motion. That plan was found as economical as any that had been tried ; but, after all, the power was about twenty-five times as expensive as from steam.

Mr. FISHER—Can you tell me about the value of the platinum required in a battery?

The PRESIDENT—It is not necessary now to use platinum at all. The Bunsen battery, in which carbon is substituted for platinum, is now in general use, the two elements being zinc and carbon, as in the battery before us. I believe Dr. BRADLEY stands at the head of our electricians, and we would like to hear from him with regard to this battery.

Dr. BRADLEY—I am far from considering myself at the head of our electricians. In fact, I think I know very little about electricity. I find myself in the fog about it almost every day. Electricity is a very great and a very important subject. There is a great variety of batteries, and there is a great variety of magnets, and modes of constructing magnets for batteries. I apprehend that in this exhibit the advantage is more in the construction of the magnet than in the superior quality of the battery. This would be a powerful magnet, I apprehend, under two cups of BUNSEN'S battery, or under two cups of any of the common chromic acid batteries such as are now used in all the telegraph offices. *Here* is a battery such as I have used, a very powerful battery ; and it is such a battery as is used by Mr. MCCRACKEN for the electric light which illuminates the sign of the Erie Railway. How this magnet of Mr. PREVOST is made I do not know. It may be a secret. But one thing I observe about it is, that it does not demagnetize when the circuit is broken ; and I would like to know how that is. [Breaking the circuit, the magnet was shown to retain considerable power for several minutes.]

Dr. BRADLEY here tried the large magnet, the fifteen minutes having nearly expired, and found it to possess less power than at first. In the meantime, Dr. BRADLEY'S question having been translated to Mr. PREVOST, he replied that the iron was not prepared for releasing the magnet.

Dr. BRADLEY resumed : This has still considerable force. Very soft iron will demagnetize more than this will. But I do not know of any iron that will not exhibit more or less of this phenomenon. That is a very serious objection to electro-magnetic engines for power ; for it is just as important, as the Chairman remarked just now, to demagnetize suddenly or instantaneously, as to magnetize so.

Now, I will try another experiment. I have shown that when the iron is in contact, and the magnetism is established in it, it tends to maintain itself. When the magnetic currents are established, breaking the circuit does not destroy those currents entirely. But if we put the armature at a little distance we shall observe a striking difference. Even insulated by this paper, you observe that it has sufficient power to lift the magnet ; but, when the circuit is broken, you see that the demagnetization is very complete. Still, there is something of the same persistence in the magnetic currents ; and I was sorry to see that there was so much, because it interferes with the value of the apparatus for motive power.

That two cups will maintain a two-horse power, or even a one-man power, I very much doubt. We have no reason to suppose that we can obtain from a battery any more force than is equivalent to the power of the battery minus the friction in the work done. Now, I would like to know more about this magnet. I would like to inquire what there is in here.

The CHAIRMAN—We do not wish to call it out if it is a secret, but the association have adopted the rule not to discuss anything, if any part of it is secret. We cannot, therefore, discuss the magnet. The question of the battery is, however, before us.

Dr. BRADLEY—I examined this liquid pretty carefully when it was on exhibition at the Fair of the American Institute, being one of the judges appointed to examine it ; and I will read from the report of the judges what we said about it :—

"*Liquid for Electric Batteries.*—This being the only article of the kind on exhibition is without rival in order of merit. It is similar to the ordinary chromic acid liquid now generally used. According to the exhibitor's patent it is compounded by the following recipe :—

800 grammes water.
50 " bichromate of potash.
50 " sulphuric acid.
2 " chromic acid.

"We have made tests by the galvanometer to determine the relative strength and durability of this and another liquid composed by Mr. MCCRACKEN, and find it fully equal to it. We cannot say that it is essentially better."

The McCracken liquid is composed by this formula :—

1 lb. bichromate of potash.
1 gallon water.
3 lbs. sulphuric acid.

There is a wide difference in these proportions. In the fluid of Mr. MCCRACKEN there seems to be a large excess, as compared with the other, of sulphuric acid. That, I suppose, does no harm, and with that exception the proportions are nearly the same.

I have in my possession seven or eight different recipes for making liquid for batteries, and no two of them are alike. Here is that for the old Poggendorff liquid :—

3 lbs. bichromate of potash.
4 lbs. concentrated sulphuric acid.
8 lbs. (1 gallon) water.

Dr. POGGENDORFF, I suppose, was the first introducer of this kind of liquid ; and this recipe is very similar to that of Mr. PREVOST, although the latter introduces two grammes of the pure chromic acid in 900 grammes of the liquid. The benefit of that can be no more than from an equivalent quantity of bichromate of potash ; but it is sufficient to give him a patent ; for I do not suppose any one ever used chromic acid in a battery before, because of its cost. What does the chromic acid cost per pound?

Mr. PREVOST (through an interpreter)—Four English shillings.

Dr. BRADLEY—I should think it would cost more than a dollar a pound. At any rate, its cost is so much more than that of the amount of bichromate of potash required to produce, by its decomposition, the same quantity of chromic acid, that the bichromate of potash is altogether the most economical in practical use. I should not use the chromic acid, although it does no harm. The patent can be founded only on the proportions given in the recipe.

The United States Telegraph Company have this recipe :—

5 gallons water.
6 lbs. bichromate of potash.
1 gallon sulphuric acid.

The Western Union Telegraph Company have another. Here is one, the inventor of which is unknown :

18 lbs. water.
1 lb. saturated solution bichromate of potash.
1 lb. sulphuric acid.

Mr. OGDEN has another recipe of his own :

9 lbs. bichromate of potash.
40 lbs. sulphuric acid.
7 lbs. water.

Mr. H. J. NEWTON says that—

12 fluid ounces water,
1 " sulphuric acid,
1 ounce by weight bichromate of potash,

is the the best solution for destroying organic matter.

There are seven or eight of these recipes in use, varying more or less from each other, but all in the neighborhood of the same thing, and all working well. I have never heard any complaint of any of them.

In testing this liquid of Mr. PREVOST, and that of Mr. MCCRACKEN, I could not test them fairly and fully with the galvanometer. I first put my galvanometer in the circuit with one of them, with a small resistance from a common local magnet—only one or two ohms resistance—and at the end of an hour I noted the strength of the current by the galvanometer, and I noted also the time when it finally ran down. With that resistance, they ran six or seven hours before they would be considered as run down.

WATER SUPPLY FOR JERSEY CITY.

The PRESIDENT read a paper on this subject. [We reserve it for our next issue.]

Mr. C. F. BOYLE inquired why the water need to be pumped up at Newark.

The PRESIDENT—It would cost millions upon millions to bring it down in closed pipes.

Mr. BOYLE—At Cincinnati they pump the water from the Ohio river to the top of one of the hills near the city. The steam-engines are very costly, and the pumping is a perpetual cost. It always seemed to me that it would have been better to bring the water forty miles, rather than have the perpetual cost of those engines.

The PRESIDENT—It is found in some cases that the interest of the money it would cost to bring water in closed pipes for the necessary distance, would more than pay for running the engines. In other cases it is impossible to find water at the proper level. In Brooklyn, for instance, the water must be pumped up, for there is no other way to get it. In New York we have the Croton lake, which will give us a supply for years to come, although finally it will be insufficient. On the other side of the river, they have not only the lakes referred to, but a dozen streams which can be used. Of course, water can be brought across to New York city by subterranean pipes. Prof. CHANDLER, in his recent lecture before the American Institute, gave us an analysis of water used in large cities, and also an analysis of the water of the Passaic river, which is nearly as pure as the Croton water, although it is liable to be rendered impure at any time. Should the dyeing establishments at Paterson and other places discharge their refuse salts into the river, directly or indirectly, the water would dissolve them, and they could not be taken out by any mechanical means.

Mr. FISHER—I recollect that, some years ago, some English towns were in great trouble from the pollution of the rivers by the sewers, and the fish were driven away by the impurities of the stream. It was finally resolved to improve the sewers, so that they should carry off the refuse more quickly, and the fish then returned to the river. It seems that when the drainage for a town is sluggish, a putrefaction takes place which repels the fish.

Mr. BOYLE—In the Adirondacs there is a class of fishermen that catch the trout by throwing chloride of lime into the streams, and catching the dead trout. I saw a stream which was entirely cleared of trout by throwing in a piece not larger than my two hands.

COMPRESSED AIR FOR RAILWAY PURPOSES.

Mr. J. R. FISHER read a paper on this subject. [We reserve it for our next issue.]

Adjourned until next Thursday evening, at half-past seven o'clock.

New Methods of Obtaining High Temperatures.

THE principal road to progress in the different processes connected with the manufacture of wrought iron and steel is the economical production of high temperatures. This subject, which at some future day will very properly form a special branch of scientific industry, is one of the most important elements of the success of modern iron manufacture, yet it has been very sadly neglected for a long time past, and is even at this present moment insufficiently understood by the majority of practical men in the iron works of this country. The quantity of heat theoretically required for melting a ton of pig iron, or for bringing a ton of wrought iron to a welding heat, is quite insignificant compared with the quantity of heat which is due to the fuel actually consumed in most of our ordinary reverberatory furnaces, and even the most approved foundry cupola furnaces are very far from approaching the theore ical figures which would correspond to the work performed by a given quantity of fuel burnt in them. The question of quantity of heat produced or expended is not, however, the only form in which the problem appears in the practical application of high temperatures to the manufacture of iron and steel. The welding heat of wrought iron, and still more so the melting temperature of soft cast steel, is so high that in the ordinary course of combustion a difficulty presents itself in giving to the products of combustion such a temperature as is required for the purposes in view. In this manner the terms "quantity of heat" and "intensity of heat" appear as two distinct and separate terms which have only a limited connection with each other, but which are not capable of replacing each other or being mutually converted one into the other. The combustion of any kind of fuel in the open air is capable of affording a certain temperature, the theoretical limit of which can be ascertained very correctly by calculation. Carefully conducted experiments indicate the practical limits of temperature derivable from the combustion of this fuel. This limit once reached cannot be exceeded by a mere augmentation of the quantity of fuel, and a temperature above that which corresponds to the nature of the combustible when burnt in the open air is therefore beyond the reach of the practical man, apart from all questions of economy of fuel.

The demand for intensity of heat has given rise to various methods of artificial or forced combustion by which the temperature of the products is raised above that naturally due to the fuel itself, and these methods of artificial combustion form an important feature in the modern progress in the manufacture of wrought iron, and in the melting and reheating of steel.

The methods adopted for increasing the temperature produced in modern furnaces are very different in their principles. The oldest and most generally applied means for forcing the combustion in a furnace is the compressed air blast. The temperature of combustion is increased by confining the gaseous products into a comparatively small space, and thereby counteracting the cooling influence which is due to dilatation under ordinary circumstances. The temperature of a flame is increased by the action of a blow-pipe, and in a similar manner it is possible in a reverbatory furnace to raise the heat artificially without changing the nature of the fuel by closing the ash pit and forcing a blast of compressed air through the bars. This is the construction applied to the puddling furnaces fired with wood in some of the Swedish and Russian forges, and it has proved eminently successful wherever the nature of the fuel demanded the application of such artificial means for obtaining the temperatures required in an ordinary puddling forge. The same fundamental principles, only carried out consistently and in a more complete form, are involved in one of Mr. Bessemer's most recent inventions, viz., the high-pressure furnace. Combustion under pressure, not only so far as the air is concerned when brought into contact with the fuel, but complete confinement of the combustible and of the products of combustion in the limited space of a strong air-tight furnace, from which the quantity of escaping gases can be regulated at will, thus in its turn regulating the pressure of the internal atmosphere of the furnace. Such is the programme of an invention which in its first experimental trials on a small scale has given evidence of an unprecedented inherent success, but which has remained in its embryo state up to the present moment.

The few experiments made by Mr. BESSEMER in his works at Greenwich have established the fact that the combustion of ordinary coal under the pressure of two or three atmospheres is sufficient for melting wrought iron in a crucible without the addition of carbon or carburised iron in any form. The facts ascertained by these preliminary trials have given rise to an extensive series of patents taken out by Mr. BESSEMER for divers forms and applications of this important principle to the different branches of manufactures, and particularly to the manufacture of iron and steel. All of these details await their practical trials, and it would be premature at the present moment to express an opinion as to the probable results which may be derived from these inventions.

The most successful system of artificial combustion which exists in present practice is the regenerative gas furnace of Mr. C. W. SIEMENS. The fuel is brought into the form of gas by a preliminary process, which forms an important element of the whole construction in practice, but which has nothing to do with the principle of artificial combustion involved in Mr. SIEMENS's invention. In fact, any kind of combustible gas, if obtained under a constant and regular pressure suitable to the form of the furnace and to the sizes of its passages, would form an acceptable fuel for the regenerative gas furnace. The method of artificially raising the temperature of the products of combustion consists in storing or accumulating the heat of the combustion in the regenerators, and subsequently imparting this elevated temperature to the combustible gases, and to the air in their passage to the furnace. In this manner every successive quantity of fuel burnt enters into combustion at a temperature imparted to it by the results of the previous combustion of other quantities of fuel, and the increased temperature thus gained and imparted to the regenerators serves as a further step for the next quantities of combustible gases to start from. In reality, if it were correct that the combustion of gaseous bodies produces the same quantity of heat, even at the highest temperature at which these combustibles can be brought into contact with each other, the regenerative principle would have no theoretical limits for the temperature attainable by it. This, however, exceeds those points which can be reached by practice from the obvious reason that there are no materials at our disposal which can resist temperatures approaching those extreme degrees of heat. The limits imposed upon us by practice are therefore narrower than those which Mr. SIEMENS's beautiful invention is capable of reaching and exceeding with facility. The principle of regenerating heat, once successfully established in practice, has been adopted by many inventors, who attempted to improve upon the designs and forms of construction patented by Mr. SIEMENS in many different ways. The application of cast or wrought-iron pipes for passing the air through which the products of combustion are carried off in flues surrounding the pipes, has been adopted by Messrs. GJERS, HOWSON, and JONES in their improved puddling and heating furnace. Mr. GORMAN has constructed his regenerators of firebrick tubes. Mr. E. B. WILSON arranged a series of flues of firebrick for adapting the regenerative principle to his furnace. Many of these designs had the obvious and legitimate purpose of lessening the cost of construction of regenerative gas furnaces, but none of them seem to have succeeded sufficiently to be able to take the place of the Siemens furnace in an extensive practice.

Another method of producing high temperature in furnaces adopted by modern inventors, is the application of artificial means for mixing the fuel and air intimately, and in a finely subdivided state, at the moment of their entering combustion. This increases the speed of combustion, and assists both in raising the temperature and economising fuel. In furnaces worked by gaseous fuel, the mode of mixing the gas and air which enter the furnace, is a question of the utmost importance, and one of those details which requires the most careful attention in designing and working such furnaces. There has been several patents taken out for working furnaces with compressed gas by means of tuyeres, by which the combustible gases are injected into the furnace simultaneously and intimately mixed. Mr. HOWSON's steel-melting furnace, and some of the plans patented by Mr. WILLIAM HENDERSON and others, are based upon this principle. Mr. T. R. CRAMPTON has applied the same principle to the combustion of solid fuel in his patent furnace. Mr. CRAMPTON reduces his fuel to the state of fine powder by grinding it between millstones, and injects this powder into the furnace by the action of the forced blast. The air and fuel are supplied to the furnace simultaneously, and the proportion can be regulated so as to afford the most favorable conditions for complete and rapid combustion. By such means high temperature and a considerable economy of fuel are attainable as compared with the ordinary firegrate, and very good, practical results can be obtained by intelligent management and working. It must be borne in mind, however, that the rapidity of combustion has an influence upon the temperature only in so far as it is connected with a proper proportion of fuel and of air, which is attended with complete and perfect combustion. Its principal advantage, therefore, is quantity of heat, but it is incapable of adding artificially to the intensity of the heat produced. The rapidity of combustion cannot by itself raise the temperature of the products beyond that which is naturally due to the fuel when burnt in the open air without waste, and the limits of temperature attainable in these classes of furnaces do not exceed those which can be obtained in a grate-bar furnace aided by a fan blast or any other equivalent appliance. Rapidity of combustion, therefore, is of value only so far as economy of fuel is concerned for obtaining the required temperatures in furnaces within certain limits, but it is in itself of no avail for raising the temperature of the furnace beyond the natural limits due to the character or chemical composition of the fuel employed, or for increasing the intensity of heat.—*Engineering.*

OFFICIAL LIST OF PATENTS.

Issued by the United States Patent Office.

FOR THE WEEK ENDING FEBRUARY 21, 1871.

Reported Officially for the Engineering and Mining Journal.

SCHEDULE OF PATENT OFFICE FEES

On each caveat	$10
On filing each application for a Patent (seventeen years)	15
On issuing each original Patent	20
On appeal to Commissioner of Patents	20
On application for Reissue	30
On application for Extension of Patent	50
On granting the Extension	50
On filing a Disclaimer	10
On an application for Design (three and a half years)	10
On an application for Design (seven years)	15
On an application for Design (fourteen years)	30
Registration fees for TRADE MARKS under the new law; for thirty years	25

Citizens of Canada can now obtain Patents in the United States upon the same terms as Citizens of other Countries.

For copy of Claim of any Patent issued within 30 years $1
A sketch from the model or drawing, relating to such portion of a machine as the Claim covers, from upward, but usually at the price above named $1
The full Specifications of any patent issued since Nov. 20, 1866, at which time the Patent Office commenced printing them $1 25
Official Copies of Drawings of any patent issued since 1836, we can supply at a reasonable cost, the price depending upon the amount of labor involved and the number of views.
Full information, as to price of drawings, in each case may be had by addressing

WESTERN & CO.,
No. 37 Park Row, New York.
CHARLES ROGERS, Solicitor.

111,896.—MACHINE FOR CUTTING AND MITERING PRINTERS' RULES.—Frank H Aiken, Franklin, N. H.

111,897, antedated February 4, 1871.—GOVERNOR VALVE CONNECTION.—John F. Allen, Harlem, N. Y.

111,898.—FISH HOOK.—Levi Arnold, Belchertown, Mass.

111,899.—MACHINE FOR CUTTING SCREWS.—James S. Atkinson, Ormsby Borough, Pa.

111,900.—MACHINE FOR CUTTING LEATHER.—Horace Z. Baker, Pawtucket, R. I.

111,901.—CURRIER'S TOOL.—James T. Barnstead, Peabody, Mass.

111,902.—TAP FOR OIL CANS.—Jabez A. Bostwick, New York, N. Y.

111,903.—SPRING CARRIAGE CUSHION.—Thomas S. Burnett, Syracuse, N. Y.

111,904.—WOOD PAVEMENT.—William Bushnell, Elizabeth, N. J.

111,905.—WIRE STRETCHER.—Albert Byington, Rochelle, Ill.

111,906.—WASHING MACHINE.—William H. Carman and Richard P. McColinm, Philadelphia, Pa,

111,907.—CHURN.—Franklin B. Chapman, Salisbury, Mo.

111,908.—VALVE FOR WATER ENGINES.—Abraham Coates, Watertown, and George W. Lascell, Syracuse, N. Y.

111,909.—WASHING-MACHINE.—John Court, Memphis, Tenn.

111,910.—TREATING BLOOD FOR THE MANUFACTURE OF FERTILIZERS AND AMMONIACAL SALTS.—John J. Craven, Jersey City, N. J.

111,911.—PLOW.—Francis Cremer, Elmwood, Ill.

111,912.—MANDREL FOR GAUGING AND CUTTING SOLDER WIRE.—Lewis Cutting, San Francisco, Cal., assignor to himself and Francis Cutting.

111,913.—VEGETABLE-CRUSHER.—Reuben Daniels, Woodstock, Vt.

111,914.—BASE-BURNING STOVE.—Edward Mortimore Deey, New York, N. Y.

111,915.—FASTENING END-BOARDS IN WAGONS.—George W. Diller, Odell, Ill., assignor to himself and George B. Woodbury, same place.

111,916.—CONDENSER AND FEED-WATER HEATER FOR STEAM ENGINES.—Joseph Dilworth and John Colbourg Hodgins, Toronto, Canada.

111,917, antedated February 11, 1871.—FANNING-MACHINE.—Edward P. Doremus, Washington, La.

111,918.—LUBRICATOR FOR WHEELS, PULLEYS, AND JOURNALS.—Edwin Douden, Lykens, Pa., assignor to himself and Charles Broome, same place.

111,919.—REFLECTOR.—Francis P. Doyle, New York, N. Y., assignor to himself and John Cooke, same place,

111,920.—CRUET-STAND.—Josiah W. Ells, Pittsburg, Pa.

111,921.—MACHINE FOR FORMING ARTIFICIAL STONE.—Josiah S. Elliott, Boston, Mass., assignor to the Union Stone Company, same place.

111,922.—MACHINE FOR MOLDING TUYERES.—Samuel English, Troy, N. Y., assignor to himself and James Ostrander, same place.

111,923.—PRESS FOR HAY, COTTON, &c.—Christopher D. Findlay and David D. Craig, Macon, Ga.

111,924.—HORSE-HOLDER ATTACHMENT TO CARRIAGES.—George W Goodwin, Petersburg, Va.

111,925.—CULTIVATOR PLOW.—William Gowen, Bartlett, Tenn.

111,926.—EARTH CLOSET.—Edmund Griffith, Wilmington, Del.

111,927.—MILLING TOOL.—Levi Griswold, Branford, Conn.

111,928.—CARRIAGE.—Chauncey Holmes Guard, Toronto, Canada.

111,929.—FIRE-PLACE.—Joseph Hackett, Louisville, Ky.

111,930.—MAKING CIDER.—George B. Hamlin, Willimantic, Conn.

111,931.—PATTERN FOR CASTING GROOVED ROLLERS.—John Herald, Unadilla, N. Y.

111,932.—COW-MILKER.—Elisha A. Hewit, Groton, Conn.

111,933.—SELF-ADJUSTING CAR TRUCK.—Edward Hipkins, Burford Township, Canada.

111,934.—CAR TRUCK.—Edward Hipkins, Burford Township, Canada.

111,935.—HAT-SIZING MACHINE.—James H. Hopkins, Newark, N. J., assignor to himself and William Carmollto, same place.

111,936.—FLY-TRAP.—Peter D. Horton and Ezra T. Bryan, Marengo Township, Mich.

111,937.—STEAM ENGINE.—John Houpt, Springtown, Pa.

111,938.—ROOFING TILE.—Charles Howard, Warren, Ohio.

111,939.—SNOW-SHOVEL TIP.—Eber Hubbard, Seneca Falls, N. Y.

111,940.—EXCAVATING MACHINE.—Joseph M. Hughes and Andrew J. Mapes, Independence, Mo.

111,941.—MACHINE FOR STRAIGHTENING BOLTS.—Charles E. Hunter, Hinsdale, N. H.

111,942.—LIFTING-JACK.—Benjamin F. Johnson, Glasgow, Mo.

111,943.—LOCK-STOP COCK.—J. Evans Jones, Tidioute, Pa.

111,944.—DRAFT DEVICE FOR THREE HORSES.—Owen W. Jones, Columbus, Wis.

111,945.—COMPOUND FOR PLATING AND POLISHING.—Michael J. A. Keane, New York, N. Y.

111,946.—SASH-HOLDER.—William Haskell King, Newark, N. J., and Jared Rowland, Williamsburg, N. Y., assignors to William Haskell King.

111,947.—SECURING STEEL OR IRON PINS IN WOOD.—Richard Kitson, Lowell, Mass.

111,948.—PASSENGER-REGISTER FOR CARS.—John Kurz, Philadelphia, Pa.

111,949.—HORSE-POWER.—Daniel L. Lamon, Boston, Ga.

111,950.—REFRIGERATOR.—John H. Lester, Niantic, Conn.

111,951.—BASE-BURNING STOVE.—Dennis G. Littlefield, Albany, N. Y.

111,952.—METHOD OF ATTACHING HANDLES TO SCRAPERS.—Edward C. Locke Providence, R. I.

111,953.—SAW-TOOTH SWAGE.—John Lough, Buckingham, Canada.

111,954.—BEAM COMPASS.—Josiah Lyman, Lenox, Mass.

111,955, antedated February 17, 1871.—BATHING-BRUSH.—Joseph Marshall, Brooklyn, N. Y.

111,956.—MILLSTONE.—John W. Masury, Brooklyn, N. Y.

111,957.—LEATHER-PUNCHING MACHINE.—John Matheis, Ottawa, Ill.

111,958.—WASHING-MACHINE.—Erwin W. Maxson, Scranton, Pa.

111,959.—BURGLAR-ALARM.—John McDowell, Washington, Pa.

111,960.—LAMP-BURNER.—William C. McGill, Cincinnati, Ohio.

111,961.—PUMP.—Charles L. Merrill, Watertown, N. Y.

111,962.—INDIA-RUBBER SHOE.—Christopher Meyer, New York, N. Y., and John Evans, New Brunswick, N. J

111,963.—COOKING STOVE ATTACHMENT.—Nathan S. Minniss, Oil City, Pa.

111,964.—ANTI-RATTLING WASHER.—Benjamin Morton, Fertility, Pa.

111,965.—PLOW.—James Oliver, South Bend, Ind.

111,966, antedated February 11, 1871.—DEVICE FOR GRINDING THE FLAT FACE OF VALVE SEATS.—Samuel J. Peet and Daniel Sawyer, Boston, Mass., assignors to Samuel J. Peet.

111,967.—CURTAIN FIXTURE.—Phineas W. Phillips, Salem, Mass, assignor to James F. Almy, same place.

111,968.—FELTED FABRIC.—Sames Ezra Pollard, Franklin City, Mass.

111,969.—MINIATURE WAR GAME.—Casimiro Portillo, New York, N. Y.

111,970.—LARD AND BUTTER BOX.—William Pratt, New York, N. Y.

111,971.—FIRE-PLACE GRATE.—William Pulsfort, Louisville, Ky.

111,972.—CAR-COUPLING.—Samuel H. Reed and George A. Reed, Fredericktown, Ohio.

111,973.—MACHINE FOR BRONZING.—Israel L. G. Rice, Cambridge, Mass.

111,974.—SPRING BED-BOTTOM, SEAT, &c.—Charles Rich, Poughkeepsie, N. Y.

111,975.—PLOW.—Alexander Rickard, Schoharie, N. Y.

111,976.—PRIVY.—Frank Riedel, San Francisco, Cal.

111,977.—IMPLEMENT FOR SLITTING ALD LOOPING RAGS FOR CARPETS.—Daniel A. Russell, Windham, Ohio.

111,978.—SHIRT.—Adolphe Salmon, New York, N. Y., assignor to Cahn & Salmon, same place

111,979, antedated February 6, 1871.—CORN-PLANTER.—Joseph Schott, Peoria, Ill.

111,980.—REVOLVING SHOW-CASE.—William J. Scott, Albany, N. Y.

111,981.—HOSE-RING.—George Sewell, Brooklyn, N. Y.

111,982.—STEAM ENGINE.—Joel Sharp and Joseph W. Thompson, Salem, Ohio.

111,983.—PUMP.—George F. Shaw and Henry F. Shaw, West Roxbury, Mass.

111,984.—NON-CONDUCTING MATERIAL FOR COVERING STEAM BOILERS, &c.—Benjamin F. Smith, New Orleans, La., assignor of one half his right to G. L. Laughland, same place.

111,985.—RAILWAY CAR COUPLING.—Marcus B. Smith, Mattoon, Ill.

111,986.—HEEL OF BOOTS AND SHOES.—Homer S. Smith, Darlington, Wis.

111,987.—HARVESTER.—George H. Spaulding, Rockford, Ill.

111,988.—CONSTRUCTION OF CYLINDER FOR CARDING AND OTHER MACHINES.—Joseph M Stone, North Andover, Mass.

111,989, antedated February 20, 1871.—CRADLE FOR CHILDREN.—William J. Stowell, Baltimore, Md.

111,990.—COMBINED AUGER AND REAMER.—Owen W. Townsend, Fond du Lac, Wis., assignor to himself and George O. Trowbridge, same place.

111,991.—SPINNING WHEEL.—Franz Voegtli, Montgomery City, Mo.

111,992, antedated February 11, 1871.—SEEDER.—Tennis Vreeland, Oneida, Ill.

111,993.—BALING PRESS.—Edwin R. Wallace, Jonesville, S. C.

111,994.—BREECH-LOADING FIRE-ARMS.—William G. Ward, Edgewater, N. Y.

111,995.—SASH-HOLDER.—William M. Warren, Watertown, Conn.

111,996.—PRESSED NUT BLANK.—Frank Washbourne, Brooklyn, N. Y., assignor to Steele & Johnson Button Company, Waterbury, Conn.

111,997.—PISTON-PACKING.—George Wells, Providence, R. I.

111,998.—HOOP SKIRTS.—James O. West, New York, N. Y.

111,999.—WASHING-MACHINE.—Lawrence White, Orford, Iowa.

112,000.—FAUCET.—William Crosby Wise and John Ashman, Chelsea, Mass.

112,001, antedated February 6, 1871.—CONDENSING DOUBLE-END LOCOMOTIVE ENGINE.—Joseph P. Woodbury, West Roxbury, Mass.

112,002, antedated February 18, 1871.—SLIDE-VALVE.—John C. Woodhead, Pittsburg, Pa.

112,003.—REFINING IRON, REDUCING ORES, &c.—John F. Allen, Tremont, N. Y.

112,004.—TOWEL-HOLDER.—Henry Alsop, Elkhart City, Ill.

112,005.—PAPER-BAG MACHINE.—Peter Edward Armstrong, Philadelphia, Pa.

112,006.—CORN-PLANTER.—James M. Aitchison, Omar, N. Y.

112,007.—BUCK-SAW FRAME.—John Gulick Baker, Philadelphia, Pa., assignor to Henry Disston & Son, same place.

112,008.—HAND-CAR.—William T. Beekman, Petersburg, Ill.

112,009.—WINDOW-WASHER.—Charles Edward Bell, Greenfield, Ohio.

112,010.—PORTABLE WATER-CLOSET.—Petter Bergqvist Austin, Minn.

112,011.—SEAL LOCK.—Wilson Bohannan, Brooklyn, N. Y.

112,012.—MACHINE FOR CLEANING GARDEN WALKS.—Peter Boice, Chatham Village, N. Y.

112,013.—DETACHABLE MAGAZINE FOR COOKING STOVES AND RANGES.—Lewis Bridge, Philadelphia, Pa., assignor to David Stuart and Richard Peterson, same place.

112,014.—MOP-HOLDER.—John Brizee, Alvarado, Cal.

112,015.—VALVE-GEAR FOR DIRECT-ACTING ENGINES.—Adam S. Cameron, New York, N. Y.

112,016.—SEWING-MACHINE FEEDING MECHANISM.—Mary P. Carpenter, San Francisco, Cal.

112,017, antedated February 18, 1871.—SIGNAL-BOX FOR FIRE-ALARM TELEGRAPHS.—Stephen Chester, New York, N. Y.

112,018.—PUMP.—Nathan T. Coffin, Knightstown, Ind.
112 019.—BINDER FOR SEWING-MACHINES.—Jacob L. Coles, Newark, N. J.
112.020—LUBRICATOR FOR STEAM-ENGINE.—Henry C. De Land, Syracuse, N. Y.
112,021.—IMPLEMENT FOR DRIVING SPOKES INTO HUBS OR WHEELS.—Wesley Edwards, Indianapolis, assignor to himself, John Holloway, Crawfordsville, and John F. Snider, Indianapolis, Ind.
112.022.—FRUIT-DRIER.—Benjamin F Ells, Dayton, Ohio.
112,023.—MOSQUITO-NET.—Jacob Joseph Alexander Ergenzinger, Atlanta, Ga.
112.024.—PATTERN FOR APPLYING MEASUREMENTS AND LAYING OUT GARMENTS.—Sarah C. Ewing, Indianapolis, Ind
112,025.—FLOATING WATER-ELEVATING WHEEL.—Charles Friedrich Fisher, New Orleans, La., assignor to himself, Lewis Moses, Bernard Moses, Gustave Moses, and William Bogel, same place.
112,026.—APPARATUS FOR CARBURETING AND GENERATING GAS.—Fisher Ames Fisher, Westfield township, N. J.
112,027. antedated February 21. 1871.—KNITTING-MACHINE.—G. W. Folts, Boston, Mass., and James L. Bransom, Chicago, Ill.
112,028.—WATER-WHEEL.—Charles James FOX, Charlotte, N. C.
112,029—LUBRICATOR.—Stephen F. Gates, Cambridge, assignor to the Lowell Oil Cup Company, Lowell, Mass.
112.030.—HAY-TEDDER.—Luke Hale, Hollis, N. H.
112,031.—LOUNGE AND BED.—John C. Hall, Cincinnati, Ohio, assignor to himself and Allen C. Richards, same place
112,032.—OIL-CLOTH PRINTING MACHINERY.—William Hudson Halsey, Philadelphia, Pa.
112,033.—HOLDER FOR NEEDLES IN SEWING-MACHINES.—Henry J. Hancock, New York. N. Y.
112,034.—ROAD-BED.—Napoleon R. Heafer, Bloomington, Ill.
112.035.—FAUCET.—William H. Hedges, Newark, N. J.
112 036.—TRIP-HAMMER.—Benjamin Hershey, Erie, Pa.
112.037.—SPRING FOR VEHICLES.—Benjamin Hershey and Richard Dudley. Erie, Pa.
112,038.—SCHOOL-DESK AND SEAT.—Charles J. Higgins, Indianapolis, Ind.
112.039.—PLOW-COLTER,—Ephraim O. Hodge. Oneonta, N. Y.
112,040.—FOLDING-CHAIR.—Francis March Holmes, Boston, Mass.
112.041.—FOLDING-CHAIR.—Francis March Holmes, Boston, Mass.
112,042.—WINDOW-SASH LOCK.—Bennet Hotchkiss, New Haven, Conn.
112,043.—HYDROSTATIC SCALES.—Orvis D. Hudson, Waupun, Wiss.
112.044.—BASE-BURNING STOVE.—George G. Hunt, Chicago, Ill.
112,045.—MANUFABTURE OF PAPER AND LEATHER-BOARD.—Carleton, B. Hutchins, Ann Arbor, Mich.
112,046.—MANUFACTURE OF FLOUR.—Elias S. Hutchinson, Baltimore, Md.
112 047.—VALVE.—John Johnson, Brooklyn, N. Y.
112.048.—HALTER-BUCKLE AND RING.—Llewellyn E. Jones and Theodore M. Barber, Syracuse, N. Y.
112,049.—STEAM-GENERATOR.—James L. Judge, Milwaukee, Wis.
112.050.—TUCK-MARKER FOR SEWING-MACHINES.—James Franklin Kellogg, North Bridgewater, Mass.
112,051.—LATHE.—James Kievlan, Chicago, Ill., assignor to himself and William Wisdom, same place.
122,052.—DUMPING-CAR.—Sidney D. King, Middletown, N. Y.
112,053.—FOLDING-BEDSTEAD.—Kasimir Krenkel, New York, N. Y.
112,054.—CASTING SOLDER-WIRE.—Eduard M. Lang, Portland, Me.
112,055.—DUMB-WAITER.—Tolbert Lanston, Washington, D. C.
112.056.—BOOT.—Jacob S. Lewis, Baltimore. Md.
112,057.—MODE OF LASTING SHOES.—William H. Lovejoy, Lowell, assignor to himself and Christopher Robinson, Lynn, Mass.
112,058.—ENGINE-GOVERNOR.—John D. Lynde, Philadelphia, Pa.
112,059.—QUARTZ-MILL.—David D. Mallory, Mystic Bridge, Conn.
112,060.—AIR-PUMP.—Robert Mudge Marchant, London, England.
112,061.—HARNESS-SADDLE TREE.—John H. Martin, Columbus, Ohio.
112,062.—CARPENTERS' PLANE.—William Miller, Boston, Mass., assignor to himself and C. E. Woodman, same place.
112,063.—AUGER-BIT.—John C. Mills, Rochester, N. Y., assignor to himself and Richard Leake, same place.
112,064.—FENCE.—John Morton, Thornville Mills, Mich.
112,065.—TOBACCO, HAY AND COTTON-PRESS.—Lewis H. Moss, Browningsville Ky.
112.066.—ROTARY STEAM-ENGINE.—Joseph C. Mossholder, Lebanon, Oregon.
112,067.—CURTAIN.—Robert Nenninger and Frederich Bräuer, Newark, N. J.
112,068.—MANUFACTURE OF SILICON STEEL.—Charles M. Nes, York, Pa
112,069.—APPARATUS FOR STEAMING OIL-WELLS.—William Nevins, Titusville, Pa.
112,070.—BOTTLE-CORK.—William Harrison Newton, Newport, R. I., assignor to himself and Samuel W. Francis, same place.
112,071.—CLOD CRUSHER.—Joseph B. Okey, Indianapolis, Ind., assignor to himself and Ferdinand A. Lehr, same place.
112,072.—CLOTHES-DRIER.—Enos L. Parker, Painesville, Ohio.
111,073.—HARNESS-PAD.—Martin W. Pond, Elyria, Ohio.
112,074.—CLOTHES-WRINGING HOOK.—James H. Pratt, Lynn, Mass., assignor to himself and Benjamin F. Larrabee, same place.
112,075.—PASTEBOARD-BOX.—William Pratt. New York, N. Y.
112,076.—DOOR-LOCK.—Johnson M. Quinby. Westbrook, and A. S. Dyer, Cape Elizabeth, Me.
112,077.—MODE OF MANUFACTURING GOLD, SILVER, OR PLATED-WARE.—Henry G, Reed, Taunton, Mass., assignor to Reed & Barton, same place.
112,078.—SIFTING-SHOVEL.—Thomas F. Rooney, Chicago, Ill.
112,079, antedated February 20, 1871.—COMBINED GANG-PLOW AND CULTIVATOR.—Orestes Sampson, Petersburg, Ill.
112,080.—GRINDING-MILL.—George Selsor, Philadelphia, Pa.
112.081.—HOT-AIR FURNACE.—Samuel B. Sexton, Baltimore, Md.
112,082.—FRUIT-CAN.—Joseph S. Shaneman and Joseph S. Hoon, Beaver Falls, Pa.
112,083.—KITCHEN-TABLE.—John Shaw, Whitby, Canada.
112,084.—MANUFACTURE OF METAL TUBES AND COLUMNS.—Frederick H. Smith, Baltimore, Md.
112,085.—SPRING BED-BOTTOM.—Howard Smith, Grovetown, N. H.. and James Porter, Portland, Me.
112,086.—DEVICE FOR SEPARATING EYELETS.—Stephen N. Smith and Solomon W. Young, Providence, R. I., assignors to Union Eyelet Company, same place.
112,187.—GRAIN-CLEANING MACHINE.—Jay Sternberg, Webster City, Iowa.
112,088.—PRODUCING GAS FROM SOLID CARBON.—Levi Stephens, Washington, D. C.
112,089.—ATTACHMENT FOR RANGES AND STOVES.—David Stuart, Philadelphia, Pa., assignor to Stuart, Paterson & Co., same place.
112.090.—CHEESE-VAT.—Ezra H. Stuart and Walter A. Stuart, Cedarville, N. Y.
112.091.—LIQUID METER.—William G. Stuart, Chicopee, Mass.
112.092, antedated February 16, 1871.—MEAT-TENDERER.—Levi B. Tarbox, Collidersville, N. Y.
112,093.—GRAIN-DRILL.—John H. Thomas and Phineas P. Mast, Springfield, Ohio.
112,094.—HANDLE FOR CROSS-CUT SAW.—Edward W. Tilton, Oshkosh, Wis.
112.095.—COTTON-PPESS.—Gabriel Utley, Chapel Hill, N. C.
112,096.—WHIFFLETREE-HOOK.—Amos Verbeck. Sterling, Ill.
112.097.—PROPORTIONAL SCALES FOR THE CONSTRUCTION OF TOOTHED GEAR.—John Walker, Philadelphia Pa.
112,098.—WHIFFLETREE.—Joseph Ward, Honeoye Falls, N. Y.
112.099.—WHEELS FOR VEHICLES.—James Weathers, Greensburg Ind.
112,100.—WATER-WHEEL.—William N. Whipple, Niles, N. Y.
112 101.—WRENCH.—Rollin White, Lowell, Mass.
112,102.—DUST-PAN.—Henry Whittemore, Orangetown, N. Y.
112,103.—DRIVING MECHANISM FOR ROVING, SLUBBING, AND OTHER MACHINES.—Alfred Wilcock, Richard Robinson, and Frederick Wilcock, Rochdale, Great Britain.

REISSUES.

4,266.—PAPER-FOLDING MACHINE.—Cyrus Chambers, Jr., Philadelphia, Pa.—Patent No. 15,842, dated October 7, 1856; reissue No. 4,059, dated July 26, 1870.
4,267.—PIPE AND FIXTURE FOR WELLS.—John H. Duck and Elias K. Whitcomb Elgin; said Whitcomb assigns his interest to James T. Whipple, Chicago, Ill.—Patent 58,721, dated October 9, 1866.
4,268.—SEAT FOR SCHOOL-DESKS.—George H. Hildreth, Lockport, N. Y.—Patent No 55,293, dated June 5, 1866.
4,269.—Division A.—HOISTING APPARATUS.—Otis Brothers & Company, Yonkers, N. Y., assignees of E. G. Otis, deceased.—Patent No. 124, dated January 15, 1861.
4,270.—Division B.—HOISTING APPARATUS.—Otis Brothers & Company, Yonkers, N. Y., asignees of E. G. Otis, deceased.—Patent No, 124, dated January 15, 1861.
4,271.—Division C.—HOISTING APPARATUS.—Otis Brothers & Company, Yonkers, N. Y. assignees of E. G. Otis, deceased.—Patent No. 124, dated January 15, 1861.
4,272.—BARREL.—Henry G. Porter, Grand Rapids, Mich.—Patent No. 102 432, dated April 26, 1870.
4,273.—HOISTING MACHINE.—Henry J. Reedy, Cincinnati, Ohio. Patent No. 78 879, dated June 9, 1868.
4,274.—ELECTRO-MAGNETIC GATE-OPENING APPARATUS.—William Robinson, Brooklyn. N. Y.—Patent No. 105,494, dated July 19, 1870; antedated July 8, 1870.
4,275.—BED LOUNGE.—James Seymour, administrator, William H. Coolidge, and Charles Stimson, Leavenworth Kansas, assignees of William H. Colley, deceased.—Patent No. 193,301, dated May 24. 1870.
4,276.—SAW FRAME.—The Bissell & Moore Manufacturing Company, New York. N. Y., assignees of Daniel Moore and Edwin Moore.—Patent No. 94,500, dated September 7, 1869.

DESIGNS.

4,664.—POCKET-BOOK TIP.—James C. Arms, Northampton, Mass.
4,665.—HAND-STAMP FRAME.—Jermain P. Barnes, Rochester, N. Y.
4,666.—RAILROAD STATION INDICATOR.—Francis F. Bibber, South Boston Mass.
4,667.—SPOON.—Elise De Busson, Yonkers, N. Y.
4,668.—CLOTHES-LINE REEL-IRON.—Daniel Densmore, Red Wing, Minn.
4,669.—STUCCO CENTER-PIECE.—James John, Chicago, Ill.
4,670.—SHAWL.—Martin Landenberger, Philadelphia, Pa.
4,671.—CARPET-PATTERN.—Charles S. Lilley, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,672.—CARPET-PATTERN.—Charles S. Lilley, Lowell, Mass., assignor to Lowell Manufacturing Company, same place.
4,673.—TYPE.—Andrew Little, New York, N. Y.
4,674.—OIL-CLOTH PATTERN.—James Paterson, Elizabeth, assignor to Richard H. Reeve and Benjamin C. Reeve, Camden, N. J.
4,675.—PARK SEAT.—Edward O. Schwagerl, St. Louis, Mo., assignor to himself and Shickle, Harrison & Co., same place.

TRADE-MARKS.

169.—FERTILIZER.—George Bourne, Baltimore, Md.
170.—HATS, CAPS, AND STRAW GOODS.—Dunlap & Co., New York, N. Y.
171.—COTTON BALE BAND AND TIE.—Jennings McComb, Liverpool, England.
172.—CORDS, FRINGES, RIBBONS, &c.—Silbermann, Heinemann & Co., same place.
173.—PAINT.—J. Lee Smith & Co., New York, N. J.
174.—MEDICINE.—George H. York & Co., Cambridge, Mass.

EXTENSIONS.

AZEL S. LYMAN, of New York, N. Y.—Letters Patent No. 16,568, dated February 3, 1857.
JAMES STIMPSON, of Baldwinsville, Mass.—Letters Patent No. 16,557, dated February 3. 1857.
JULIA M. MILLIGAN, of New Albany, Ind.—Letters Patent No. 16,602, dated February 10, 1857; reissue No. 493, dated September 15, 1857.
SETH C. ELLIS, of Jersey City, N. J.—Letters Patent No. 16,534, dated February 3, 1857.

Coal and Limestone.

THE Youngstown (Ohio) *Register* gives the particulars of the meeting of coal operators and limestone shippers with the furnace-owners, recently, at the Tod House, in that place. It was held in pursuance of the endeavor of the iron-makers to obtain a reduction of the prices of various materials that enter into the production of pig iron. The Mahoning Valley was pretty well represented, but only one or two representatives of the Shenango Valley were on hand. The *Register* says that, from the discussion, which was of a varied nature, it was quite evident from the opinion expressed among the coal operators, that while the state of freights and transportation facilities are as at present, they would not reduce their prices. It was, however, a very generally expressed opinion, that if sufficient cars were furnished the banks, they might be able to reduce their prices somewhat. The average capacity of all the banks of this valley is 50 per cent. greater than the amount that can be carried away from the banks. If cars could be furnished at the coal mines in sufficient quantity to carry away all the coal that is mined, they could reduce the price. But as it is they are crippled by the lack of transportation, and cannot reduce prices according to their view of the case. The manner of screening the coal was also discussed. A large number of the banks of this valley furnish their coal to the furnaces either imperfectly screened or not screened at all. A great deal of expense and waste is therefore caused to the furnace-owners by having to screen the coal at their furnaces. The banks recently opened do not come under this head. In the Shenango Valley the coal is all thoroughly screened before it leaves the banks, and the cost of producing is very sensibly lessened by this fact. The feeling among the coal operators at this meeting seemed to be in favor of a reform on that point. As regards the cost of limestone, Mr. JOHN R. GEIST, of Lowell, brought that subject to a very satisfactory conclusion by stating that he would furnish all limestone that was needed for furnace use at a reduction of ten cents per ton on present price. This indeed was the tangible result of the meeting, but it is to be hoped that the discussion of the very important subjects which were taken into consideration will be productive of the best results.

BUSINESS AND PERSONAL.

[Short notices in this column fifty cents per line each insertion.]

GLYNN'S ANTI-INCRUSTATOR FOR STEAM BOILERS.—THE only and reliable article for removing and preventing incrustation. No foaming, and does not attack metals of boiler. Liberal terms to agents. C. D. FREDRICKS, 587 Broadway, N. Y.
April 19 tf

IMPORTANT TO INVENTORS.

WESTERN AND CO.'S PATENT AGENCY.
CHARLES ROGERS, Solicitor and Manager.

In connection with the publication of the ENGINEERING AND MINING JOURNAL and the MANUFACTURER AND BUILDER, we have frequently received applications from subscribers and patrons to act as their agents in transacting business with the United States Patent Office; and in view of the increasing number and urgency of such requests, we have resolved to add this department to our business. We have accordingly organized

A COMPLETE PATENT AGENCY,

and now offer our services in procuring patents in this and foreign countries, and transacting all business relating to the obtaining of patents.

Being possessed of superior facilities, in connection with our associate attorneys in Washington and foreign countries, for the successful prosecution of this business, we do not hesitate to guarantee satisfaction to all who may entrust their business to our care.

We have engaged as solicitor and manager Mr. CHARLES ROGERS, a well-known expert in this department. Being a practical mechanic, and having been an examiner in the Patent Office at Washington for a number of years, besides enjoying an experience of more than twenty years as a solicitor of patents, Mr. ROGERS is intimately acquainted with all the details of the business, both in and out of the office.

The specifications, drawings, etc., prepared in our office, will be found to compare favorably with those prepared by any other establishment, while the intimate acquaintance of our manager with the routine of business in the Patent Office, gives us a decided advantage in managing difficult cases.

We are fully prepared to prosecute Rejected Cases and Cases in Interference and Infringements, and also to procure Reissues and Extensions of Patents.

We can also furnish Models for use in the Patent Office, to parties who may desire it, as we have made arrangements for this purpose with one of the most skilful machinists in this country, who possesses every facility for getting up models in the most perfect manner, at short notice, and on reasonable terms.

We shall give special attention to the prosecution of Rejected Applications, which have been improperly prepared by the inventor or incompetent attorneys.

We shall be ready at all times to furnish all necessary information and advice to intending applicants, and give our opinion as to the patentability of their inventions, free of charge; and we make it a rule never to take charge of a case unless we see a reasonable probability of obtaining a patent without first giving the inventor our candid opinion as to the probable result of the application.

OUR CHARGES.

Our charges are as moderate as those of any other responsible patent attorneys, as will be seen from the following figures: For preparing a case (whether simple or complicated) and attending to its passage through the Patent Office, our fee is from $30 to $40, which includes all the necessary papers and drawings. If the application is rejected we make no further charge, but prepare all necessary amendments, and, if requisite, appeal to the Board of Examiners-in-Chief. Most Patent Attorneys make an additional charge on each adverse action of the Patent Office, but we have found it more satisfactory to all parties interested to make our full charge at first; and as we expect no contingent fees, it is to our interest to prepare our cases properly at the commencement, thus avoiding annoyance to ourselves and delay in getting out the patent.

The cost of getting out a patent through our agency is—

For first Government fee, stamp, etc	$16
" our fee	$30 to 40
" final Government fee	20
Total	$66 to $76

If the case has to be appealed, the applicant pays the Government fee on appeal, $10; but we shall ordinarily make no additional charge for our services. The first two items are payable when the application is sent in, and the second Government fee when a patent has been allowed. Before an appeal is taken, in any case, the applicant will be fully advised of all facts and charges, and no proceedings had without his sanction; so that all inventors who employ our agency will know in advance what their applications and patents are to cost.

For Rejected Applications prepared by others, our charges vary somewhat according to the nature of the case, but are generally as follows:

In advance, on receiving the case	$10
When the patent is allowed	$20 to 30
Total	$30 to $40

the applicant paying such Government fees as may be required.

For preparing and filling a Caveat,

Our fee is	$15
Government fee	10
Total	$25

For attending to the obtaining of Reissues, Extensions, etc. and preparing Assignments, our charges vary according to the labor involved.

We are possessed of all the facilities for the successful prosecution of applications for patents in Great Britain, France, Belgium, and other foreign countries, on favorable terms.

Inventors who reside out of New York, and wish to procure a patent, need not go to the expense of visiting this city or Washington, but may send us a model of their invention, or a sketch and brief description; this will enable us to decide as to its probable novelty and patentability, and we can proceed at once to prosecute the case. We shall, however, be glad at all times to see our friends from any section, and give them such information as we are possessed of relating to patents, free of charge. A Post-office order for $16, to pay the first Government fee and stamp duty, should be sent along with the model; our fee $30 to $40, being payable as soon as the application is ready to be sent to Washington.

Patents granted through this agency will be described and illustrated in the columns of the ENGINEERING AND MINING JOURNAL or the MANUFACTURER AND BUILDER, without further charge to the inventor than the cost of the necessary cuts.

All communications to be addressed to

WESTERN & COMPANY,
P. O. Box, 5969, 37 PARK ROW, NEW YORK.

Advertisements.

The special advantages of the ENGINEERING AND MINING JOURNAL, *as a medium for advertisers, are so great and so widely known that it may seem almost needless to call attention to them. It is extensively circulated among the engineers of the country and takes a position in this respect before any other publication of the kind. It has a large and constantly increasing circulation among miners and mine owners, and men connected with mining operations generally. As it is the only paper in the country that makes this subject a specialty it has this field entirely to itself and is the only direct and reliable means of reaching this class of persons. Being kept on file by almost every subscriber, it is doubly valuable as a permanent means of keeping an advertisement before the public. It is the recognized organ of the coal trade, and is taken extensively by the trade throughout the country and prevents the very best means of reaching that very important class of men.*

Rates of Advertising.

The rate of advertising, compared with those of other weekly industrial publications, are very low, especially when the class of consumers among which its large circulation is almost entirely confined, is taken into consideration.

Back Page.....40 cents a line.
Inside Pages.....25 cents a line.

Engravings may head advertisements at the same rate per line, by measurement, as the letter-press

MISCELLANEOUS.

Facts for the Ladies.—John Sibley deposed: I must declare the Wheeler & Wilson to be the most wonderful and comprehensive sewing mechanism ever put in the American market. It is the simplest as well as the most cunning in principle. There is genius and high mechanical ability in its arrangement, and therefore it is most reliable and easy to keep in order. There is a directness of connection between the power and the result, never found by me in the devices of any other inventor, and the mechanical results follow of the highest possible speed, quiet and easy movement, which make it a delight to mechanicians. I think it just to denominate it one of the marvels of the age.

ANNUAL REPORT OF HE LEBANON SILVER LEAD MINING COMPANY of New York.

This is to certify that the Capital Stock of the Lebanon Silver Lead Mining Company of New York, consists of fifty Thousand Shares at the nominal par value of twenty dollars each, which has all been issued for the purchase of Mining property, and that the debts of the Company do not exceed one thousand dollars.

Dated at New York, this 2th day of January, 1871.

J. WARREN BROWN, President.
THEODORE C. POPLE, Secretary.

THOS. C. POHLE, THOS. S. OLLIVO, LOUIS FRANCKE, J. G. POHLE, } Majority of Trustees.

CITY AND COUNTY OF NEW YORK, ss.: Theodore C. Pohle, being duly sworn, says that he is Secretary of the Company named in above report, and that the facts stated in said report are true, to the best of his knowledge and belief. THEODORE C. POHLE

Sworn to before me this 16th day of February, 1871.
feb25:1t WM. A. EYDAM, Notary Public.

THE CHALMERS-SPENCE PATENT NON-CONDUCTOR CO.

ST. LOUIS BRANCH,
1202 & 1204 N. Second street.

Never deteriorates. Saves 40 per cent. Keeps steam perfectly dry. Twenty of the largest Mississippi boats have their boilers, pipes, etc., covered with this invaluable material. T. CHALMERS,
J. B. ROACH, Treasurer. Manager.

DIAMONDS AND CARBON furnished and set for drilling rock, sawing or working stone, also *Glazier's Diamonds*. See ENGINEERING AND MINING JOURNAL, January 17, 1871, for further particulars. Address: JOHN D. CKINSON, 64 Nassau st., N. Y. 2mo

WILLIAM R. TAYLOR,
Kings County Steam Boiler-Works,
MANUFACTURER OF
High and Low-Pressure Steam Boilers.
ALSO,
TAYLOR'S PATENT UPRIGHT RETURN TUBULAR BOILERS,
TANKS, GASOMETERS, SUGAR PANS, COOLERS,
OIL-STILLS AND OIL-TANKS.
ALSO,
ANDERSON'S Improved Machine for
GRINDING SEATS OF VALVES.
Nos. 345 and 347 First Street,
(Old Nos. 277 and 279,
Near North Fourth, (P. O. BOX 213.) Brooklyn, E. D.
J. M. RING, Sole Agent 265 Broadway, New York.
☞ Special attention given to repairs. dec6-6m

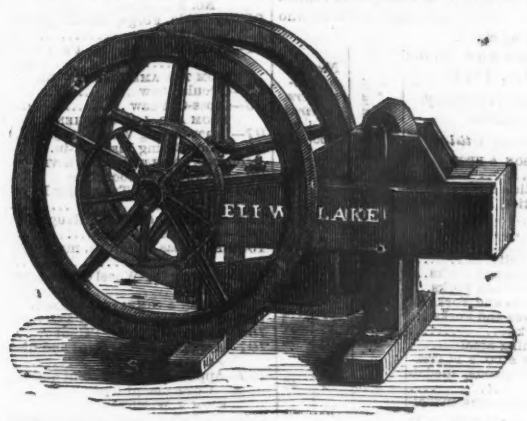
SAMUEL BONNELL, JR., OFFERS FOR SALE his SUGAR CREEK and HONEY BROOK
LEHIGH COALS,
OFFICE:
43 and 45 TRINITY BUILDING, 111 BROADWAY,
NEW YORK. Jan:1y

WILLIAM F. McNAMARA,
SOLICITOR OF PATENTS
AND COUNSELLOR-AT-LAW.
No. 37 PARK ROW, NEW YORK, ROOM 22.
Advice in Patent Law given free. mar 8:tf

LADIES DESIRING TO PROCURE A first-class Sewing Machine against easy monthly instalments or work, may apply to 294 Bowery, New York. Sep1.30-6m

MISCELLANEOUS.

BLAKE'S STONE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter to the undersigned.

☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them: and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

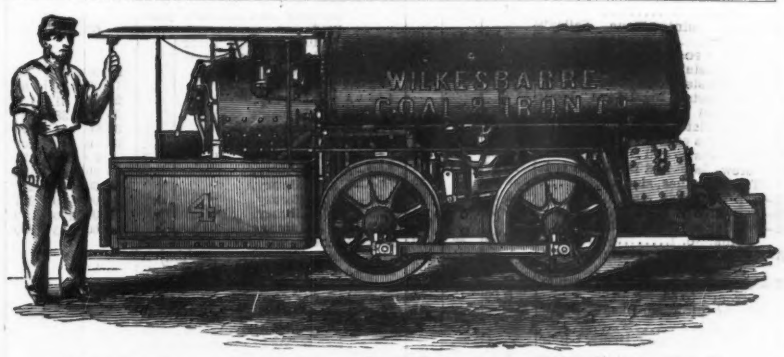
Mch. 14-1y. **BLAKE BROTHERS, New Haven, Conn.**

JOHN A. GRISWOLD, ERASTUS CORNING,
ERASTUS CORNING, JR., CHESTER GRISWOLD.

JOHN A. GRISWOLD & CO.,
PROPRIETORS OF THE
RENSSELAER IRON WORKS,
TROY, N. Y.
Bessemer Steel Works, Fort Edward Blast Furnace and Columbia Blast Furnace
MANUFACTURERS of PIG IRON, RAILROAD, MERCHANT AND SHIP IRON,
Bessemer Steel Rails, Axles, Tyres, Shafting Plates and Steel Forgings,
OF ALL DESCRIPTIONS.
Office in New York, No. 56 Broadway.
May 17:1y

NEW JERSEY ZINC COMPANY.
B. S. GIBLIN, Treasurer. GEORGE A. BELL, President
WORKS NEWARK, N. J., OFFICE No. 61 MAIDEN LANE NEW YORK.
Franklinite Pig Iron (Spiegeleisen), Spelter, Oxide of Zinc, Spiegeleisen Cinder for Blast Furnaces.
May 24:1y

LEHIGH ZINC COMPANY.
GORDON MONGES, Treasurer. B. C. WEBSTER, President.
WORKS, BETHLEHEM, PA. OFFICE, 333 Walnut Street, Philadelphia.
JOHN JEWETT & SONS, AGENTS, 182 FRONT STREET, NEW YORK.
OXIDE OF ZINC, SPELTER, SHEET ZINC.
Jun28:1y



IMPROVED DIRECT-ACTING MINING LOCOMOTIVE.

Gauge, two feet six inches or upwards; Hight above rail, five feet four inches; Width over all, five feet one inch; Adapted to burn Anthracite or Bituminous coal or coke.

Materials and Workmanship Equal to those in Full Gauge Railroad Locomotives.

Guaranteed to pass curves of twenty-five feet radius and haul on a level track in good condition
Three Hundred and Forty Gross Tons of Cars and Load.
For Photograph and full particulars, address M. BAIRD & CO.,
Feb:7:1y:eow Baldwin Locomotive Works, Philadelphia.

AVELING & PORTER'S
NEW PATENT ROAD LOCOMOTIVES
ARE OF UNUSUAL LIGHTNESS, SIMPLICITY, AND POWER,
AND ARE
DRIVEN AND STEERED BY ONE MAN.

They are made from 4½ to 8½ tons in weight and will haul as great a load *with the same weight of Engine* on any roadway as Traction Engines fitted with Rubber Tyres. Their cost for wear and tear *is less*, their first cost is *thirty per cent less*, and their daily working expenses are *not so great by one third*. Fixed and movable machinery can be driven by these Engines without extra cost for fitting them.

Aveling & Porter manufacturers, Rochester, England. Agent for the United States, W. CHURCHILL OASTLER, 43 Exchange Place, New York.

Tramway Engines for mines etc., Steam-ploughs, Steam Road Rollers, light and heavy Agricultural Locomotives, Portable Engines, Road locomotives with India Rubber Tyres, etc. oct. 11.6m

P. H. VAN DER WEYDE, M. D.,
(Late Professor of the N. Y. Medical College, of Mechanics, etc., at the Cooper Institute, and of Industrial Science at the Girard College, Philadelphia.)
Analytical & Consulting Chemist and Engineer.
887 Pacific avenue, above Grand avenue, Brooklyn
Office ENGINEERING AND MINING JOURNAL, 37 Park Row New York City. jan30:6t

R. P. ROTHWELL,
MINING AND CIVIL ENGINEER AND METALLURGIST,
From the Imperial School of Mines, Paris, member of the Geological Society of France, etc,
OFFICE, WILKESBARRE, PA.
Having had a large practical experience in Europe and this country, is prepared to examine and report on all kinds of mineral property, superintend mines, and metallurgical works, assay ores, etc. 13-2-qp

ADOLPH OTT,
CHEMICAL ENGINEER,
May be employed professionally as an expert on practical subjects, involving both Chemical and Mechanical knowledge. A specialist in various branches of Technology. Assays and Analyses of all kinds. Address, Editorial Rooms of the "Engineering and Mining Journal," 37 Park Row, New York City.
☞ Written communications preferred. nov28-tf

EDSON'S
RECORDING STEAM GAUGE. These Gauges give an Automatically Written Record of all fluctuations in Pressure, to which a boiler has been subjected.

They Reduce the Risk of Explosions, by prompting a more careful attention to duty.

They Economise Coal, by showing when the firing is not periodically and properly done.

They Sound an Alarm when the limit of pressure is reached, and are adapted for Locomotives, Marine and Stationary Boilers.

Manufactured and for sale by the
RECORDING STEAM GAUGE CO.
91 Liberty street, New York.

PATENT AUTOMATIC STEAM VACUUM PUMP.

For City Water-Works, Mines, Railroads, Steamships, Breweries, Sugar Refineries, Tanneries, and various Manufacturing Purposes.

Manufactured by the Automatic Steam Vacum Pump Manufacturing Co. Office, 111 Broadway, New York.
SIMEON N. DRAKE, Pres. MARTIN KLENEN,
Send for Illustrated Circular.

IMPROVED
TIN-LINED LEAD PIPE.

THE GREAT CHANGES WE HAVE recently made in the construction of our TIN-LINED LEAD PIPE has so added to its strength and durability as fully to entitle it to be termed IMPROVED. The lead coating has been increased, so that all sizes of our TIN-LINED LEAD PIPE are now the same thickness and weight of ordinary lead pipe. The increased thickness of the pipe allows the joints to be made with ordinary Plumbers' solder, and the Pipe to be worked in the same manner as Lead Pipe. The cost of the pipe has been reduced to the low price of fifteen cents per pound, with a discount to the trade.

PURE WATER

These improvements in our TIN-LINED LEAD PIPE have the hearty approval of ARCHITECTS and PLUMBERS wherever they are known.

Warranted to be stronger and more durable than Lead Pipe of corresponding sizes and letters.

In ordering or making inquiries for prices, send bore of pipe required and head or pressure of water. Circulars and sample of pipe sent by mail free. Address,
THE COLWELLS, SHAW & WILLARD MF'G CO.,
213 Centre street (between Canal and Grand streets), New York.

OPINIONS OF THE MEDICAL PROFESSION.

R. OGDEN DOREMUS, M. D., Professor of Chemistry and Toxicology in the New York Bellevue Hospital Medical College, writes: "There can be no question as to the poisonous nature of lead when introduced into the human system; and as it may gain entrance so insidiously, and from such a variety of sources, it has been a great desideratum to obtain an inert substitute for the conveying of liquids which should be pure, flexible, cheap, strong, durable and easily worked. By your ingenious invention of a pipe of Block-Tin, surrounded, strengthened and protected by a thick coating of lead, all the valuable qualities of Block-Tin are obtained, and all the objection to the use of lead removed. All points considered, I esteem your TIN-LINED LEAD PIPE superior to that made of Lead, Iron, Galvanised Iron, Block-Tin alone, or any other variety of Pipe I am familiar with."

"I am of the opinion that your Tin-Lined Lead Pipe will, in a sanitary point of view, be of infinite good to our citizens."—WILLARD PARKER, M. D., New York.

From the American Agriculturist.

NEW YORK, November, 1867.

"SAFE PIPE FOR DRINKING WATER.—Lead poisoning, from water brought in lead pipe, is the often unsuspected cause of disease and death. Galvanised iron pipe, wood and cement pipe, are expensive and inconvenient substances. The TIN-LINED LEAD PIPE, we believe, is perfectly safe. Our Tin in it has led us recently to lay some eighty feet of it, through which all our drinking water is drawn."

NATIONAL PARK BANK,
NEW YORK, May 19, 1870.
TO THE COLWELLS, SHAW & WILLARD MF'G CO.:

DEAR SIRS: Our bank building having been plumbed throughout with your TIN-LINED LEAD PIPE, we take pleasure in stating that it has worked to our entire satisfaction. No repairs have been made up to the present time. Yours respectfully,
J. L. WORTH, Cashier.

THE COLWELLS, SHAW & WILLARD MF'G CO.,
213 Centre street (between Canal and Grand streets), New York, manufacturers of TIN-LINED LEAD PIPE, BLOCK TIN PIPE, LEAD PIPE, SHEET LEAD, SOLDER, &c. Also, the Plumbers' TUBULAR SAFETY JOINT, particularly adapted to LEAD, BLOCK TIN and TIN-LINED LEAD PIPE. Orders solicited.

N. B.—Circulars and Samples of TIN-LINED LEAD PIPE sent by mail free.

PUBLICATIONS.

THE MANUFACTURER AND BUILDER,
Western and Company, Publishers,
37 Park Row, New York.

ANNUAL SUBSCRIPTION PRICE (invariably in advance), $1 50 each for less than four copies; four to nine copies, $1 25 each; ten to fourteen copies, $1 20 each; fifteen to nineteen copies, $1 10 each; twenty copies, $1 each. Papers are addressed to each name.

$250,000
To be Given Away!

—o—

UNPRECEDENTED
LIST OF PRIZES.

—o—

THE
Manufacturer and Builder,

Offers to both

REGULAR AND VOLUNTEER CANVASSERS.

For cash subscriptions,

Princely Premiums for Great Efforts,

And

GENEROUS RETURNS FOR THE SMALLEST FAVORS.

Almost anything in the world, great or small, that any body wants, can be acquired by canvassing for the

Manufacturer and Builder,

With less expenditure of time and labor, in most cases, than by any other method.

If not found with terms precisely specified in the following

Select Descriptive List of Hundreds of Rich Premiums,

It is only necessary to write to Western & Co., Publishers, 37 Park Row, New York, describing the COVETED ARTICLE, and special terms will be made for obtaining it as a Prize for Suscriptions; in most cases, terms that are equivalent to GIVING THE CANVASSER

NEARLY ALL HE CAN COLLECT,

As will be seen by examining the List.

In these days, CAPITAL is necessary for establishing the enormous circulation required to make a first-class periodical like THE MANUFACTURER AND BUILDER profitable in spite of its giganuc expenses. Capital is necessary to pay for the best productions of the best writers, for the costly designs and engravings, for the fine, thick paper, and for the extra style of printing, that make THE MANUFACTURER AND BUILDER the type of a new era in American polytechnic journalism. Capital is above all necessary to PAY THE ARMY OF CANVASSERS employed in bringing the merits and benefits of this journal home to the intelligent millions of the American people.

Our Plan for 1871
IS
CAPITAL WITHOUT STINT

For these purposes, and

MAGNIFICENT PAY

To all who help us.

We desire to pay out the coming year not less than a Quarter of a Million of Dollars from our receipts and reserves, for the services of Volunteer Agents alone, in all the States, Territories, and Provinces of North America. Our paper challenges comparison with the best Journals of Arts and Engineering in the world. It is at the same time one of the cheapest publications ever issued from the press; and to all its attractions we now add a range of Premiums tantamount almost to a free gift of our paper, our labor, our earnings, for the year, for the sake of introducing THE MANUFACTURER AND BUILDER to myriads of readers, whose patronage in future years will recompense our present lavish outlay.

For these premiums are to be not only offered, but paid; not only paid, but paid promptly to the letter and spirit of the description, and to the satisfaction of all. Every premium is of the best and most desirable kind we can select, and from manufacturers whose names are a guarantee of excellence.

The premiums range from twenty-five cents to twelve hundred dollars in value—the prices annexed are in no case exaggerated, but the actual cash value invariably—so that one who aims at a large premium will not lose his labor even if obliged by any cause to suspend his efforts, because it is never too late to decide what premium to select, and no list is too small to earn a valuable prize, or rather a choice of many valuable prizes.

Every class of persons can share in this profitable employment, at times, in ways and in places suited to their circumstances, and with rewards adapted to their different desires.

You never know what you can do until you Try.

Thousands of persons, of both sexes, once straitened and perplexed to get a living, have suddenly found out that they had the gift to **get rich by canvassing!** Study the nature of the business, and particularly human nature; study the arguments and inducements for subscription to THE MANUFACTURER AND BUILDER, lay your plans well, and get every body to help you, and then let nothing discourage or stop you.

In the following table is given the price of each article and the number of subscribers required to get it free, at $1 50 a year; also at the club rate of $1 a year. The descriptions of a few articles are given in the fourth column, the balance is given in our *Descriptive Premium Sheet*, which will be sent on application to those who contemplate getting up clubs.

List of Premiums and Terms for Vol. III., 1871.

A Free Field for Everybody. No Competition.

No.	Names of Premium Articles.	Price of Premium.	Number of Subscribers required at $1 50	at $1
	FROM PATTERSON & BROS.			
1	Tool Chest	$45 00	60	190
2	Case Mathematical Instruments	9 00	18	55
3	Case Mathematical Instruments	15 00	22	75
4	Pocket Knife	1 50	4	21
5	Pocket Knife	2 00	5	22
6	Pocket Knife	2 50	6	25
7	Lady's Pocket Knife	2 00	5	22
8	One dozen Knives and Forks	14 0	21	70
9	One dozen Knives and Forks	18 50	27	90
10	One dozen Knives and Forks	22 00	33	110
11	One dozen Knives and Forks	25 50	39	124
12	Carver and Fork	5 00	13	37
13	Fluted Sharpening Steel	2 50	6	25
	FROM HALL, ELTON & CO.'S PLATE.			
14	One dozen Tea-spoons, medallion	5 75	14	40
15	One dozen Table-spoons, medallion	12 00	19	65
16	One dozen Table Forks, medallion	12 00	19	65
17	Butter-Knife, medallion, solid	1 00	4	
18	Soup-Ladle, medallion	5 75	14	40
19	Ice or Water-Pitcher, No. 3	17 00	26	80
20	Pocket Fruit Knife, No. 12	2 00	5	2
21	Revolving Butter-Cooler, No. 80.	8 00	16	52
22	Cake-Basket, No. 1867	10 00	18	58
23	Caster, 6 bottles, chased, No. 2039	9 25	18	54
24	Fruit-Basket, No. 200	13 50	21	75
25	Child's Cup, No. 041	2 75	6	25
26	Knife, Fork, and Spoon, child's set, morocco case	3 00	8	30
27	One dozen Napkin-Rings, medallion	9 00	17	54
28	Tea Set, gold lined, No. 1822	48 00	52	180
29	Tea Set, No. 1866	36 00	45	135
	FROM COLBY BROS. & CO.			
30	Knife-Cleaner	75	2	
	FROM MABIE, TODD & CO.			
31	Gold Pen and Pencil, rubber case	8 00	15	45
32	Gold Pen and Pencil, rubber case	6 75	13	37
33	Gold Pen, silver or gold holder, in box	4 25	9	32
34	Gold Pen, extension gold case, in box	20 00	29	90
35	Lady's Gold Pen, ivory holder, in box	2 75	6	25
	FROM HENRY RUSSELL & CO.			
36	Downer Mineral Oil Lamp, No. 19-6	4 75	10	35
37	Downer Mineral Oil Lamp, No. 1963	9 25	17	56
	FROM C. F. A. HEINRICH.			
38	St. Germain Student Lamp, largest size	8 25	15	45
	FROM FAIRBANKS & CO.			
39	Family Scales	14 00	21	70
	FROM COLBY BROS. & CO.			
40	Clothes-Wringer	7 5	10	35
	FROM ALEXANDER M. LE LEY.			
41	Refrigerator, the Zero, No 38	38 00	42	142
42	Cooler, the Newport, No. 1	12 00	15	45
43	Hot-Air Coal Furnace, the Gothic, No. 9	125 00	135	450
44	Hot-Air Wood Furnace, Gothic, No. 10	150 00	162	525
	FROM THE STANLEY RULE & LEVEL CO.			
45	Iron Smoothing-Plane, Bailey's patent	5 00	13	37
46	Iron Smoothing-Plane, Bailey's patent	6 50	14	42
47	Iron Jack-Plane, Bailey's patent	7 50	15	47
48	Iron Fore-Plane, Bailey's patent	9 00	17	55
49	Iron Jointer-Plane, Bailey's patent	10 00	18	58
50	Wood Smoothing-Plane, Bailey's patent	3 00	8	30
51	Wood Fore-plane, Bailey's patent	4 50	10	35
52	Wood Jointer-Plane, Bailey's patent	4 75	12	36
53	Wood Jointer-Plane, Bailey's patent	5 50	14	40
	FROM POST & GODDARD.			
54	Machinists' Hand-Taps	17 60	25	75
55	Machinists' Hand-Taps	52 80	65	220
56	Machinists' Hand-Taps (your choice)			
57	Screw-Plates and Dies, size A	5 00	12	37
58	Screw-Plates and Dies, size B	8 00	15	45
59	Screw-Plates and Dies, size C	10 00	18	58
60	Screw-Plates and Dies, size D	13 00	20	70
61	Tap-Wrenches, size A	3 00	7	25
62	Tap-Wrenches, size B	4 00	9	30
63	Tap-Wrenches, size C	5 00	12	37
64	Set of 11 Taper Shank-Twist Drills, No. 1	19 75	29	90
65	Set of 29 Drills, straight shank, mounted, No. 9	12 00	18	60
66	Set of 60 Drills, steel wire gauge from 1 to 60, No. 12	8 00	15	45
67	Set of 21 Taper-Shank Drills, No. 3	44 00	58	175
68	Set of 9 Bit-Stock Drills, 1-16 to 3 8 in	2 80	6	25
69	Self-Centering Drill-Chucks, Beach's patent, for jewelers, No. 0	10 00	18	58
70	Self-Centering Drill-Chucks, Beach's patent, for drilling, No. 0	7 00	14	40
71	Self-Centering Drill-Chucks, Beach's patent, 0 to 3-16, No. 1	6 00	13	38
72	Self-Centering Drill-Chucks, Beach's patent, 1 to 60 S. W. E., No. IX	7 00	14	40
73	Self-Centering Drill-Chucks, Beach's patent, 0 to 1/4, No. 3	14 00	23	77
74	Drill-Grinding Machine, No. 1	10 00	18	58
75	Drill-Grinding Machine, No. 2	20 00	30	95
76	Auger-Bits, your choice of 4 sets	— —	—	—
	FROM L. W. POND.			
77	Foot-Lathe, No. 1	50 00	65	204
78	Foot-Lathe, No. 2	30 90	47	124
	FROM COLBY BROS. & CO.			
79	Miniature Steam-Engine and Boiler	1 36	5	23
	FROM RUNSELL & SPEIR.			
80	Steam-Engine (1 H. P.) and Boiler	300 00	310	1125
81	Steam-Engine (3 H. P.) and Boiler	600 00	640	2250
82	Steam-Engine (5 H. P.) and Boiler	800 00	858	3000
83	Steam-Engine (10 H. P.) and Boiler	1200 00	1285	4500
84	Steam-Pump, C. B. Hardick's, No. 0	120 00	155	540
85	Steam-Pump, Cameron & Co.'s, No. 1	150 00	192	675
86	Steam-Pump, Cameron & Co.'s, No. 2	200 00	257	900
87	American Submerged Pump	12 00	19	65
	FROM GEORGE TALLCOT.			
88	Turbine Water-Wheel, Reynold's, 12 in.	105 00	125	360
89	Turbine Water-Wheel, Reynold's, 24 in.	226 50	279	800
90	Turbine Water-Wheel, Reynold's, 36 in.	384 50	460	1350
91	Rotary Blower, Root's patent, No. 1	$5	70	275
92	Rotary Blower, Root's patent, No. 2		105	420
93	Portable Forge, Root's patent, No. 1	48 00	65	260
94	Portable Forge, Root's patent, No. 3	80 00	105	420
	FROM THE AMERICAN SAW CO.			
95	Circular Saw	125 0	135	473
96	Cross-Cut Saw	6 6	14	42
	FROM A. P. & M. STEPHENS.			
97	Labor-Saving Vise, 2-in. jaw	4 00	9	32
98	Labor-Saving Vise, 4½-in. jaw	12 00	28	58
	FROM THE STANLEY RULE & LEVEL CO.			
99	Boxwood two-foot Rule	2 50	6	25
100	Silver-Plated Triangular Drawing-Scale	6 00	16	52
101	Pocket Sheet-Metal Gauge	5 00	13	37
102	Arkansas Oil-Stone	1 75	5	22
103	Arkansas Oil-Stone, mahogany case	3 25	8	30
104	Gear or Cog-Wheel Calculating-Rule	4 00	12	36
	WESTERN & COMPANY'S AGENCY.			
105	Preparing and Filing a Caveat	25 00	28	80
106	Application for a Patent	30to40	35	100
107	Application for Patent and first Government fee	46to56	50	150
108	Application for Patent and all Government fees	66to76	75	250
	FROM J. W. HUTCHINSON.			
109	English Breech-loading double-barrel Gun	100 00	110	350
110	English Muzzle-loading double-barrel Gun	75 00	85	250
111	Breech-loading Rifle, the Allen	30 00	46	150
112	Revolver, Smith & Wesson's, No. 1½	12 50	19	65
113	Revolver, Smith & Wesson's, No. 2	15 00	22	75
	FROM MASON & HAMLIN.			
114	Melodeon, portable, No. 1, 4 octave	50 00	66	200
115	Melodeon, resonant, style G, 5 octave	170 00	146	510
116	Pipe-Organ, church use, style No. 29	675 00	579	2000
	FROM J. S. & C. ODELL.			
117	Pipe-Organ	500 00	430	1500
118	Pipe-Organ	700 00	600	2100
119	Baldwin Square Piano-Forte, No. 4	650 00	430	1500
120	Steinway's No. 1 Grand Piano	1200 00	860	3000
	THE AMERICAN WATCH CO., WALTHAM, MASS.			
121	Silver Watch	20 00	32	100
122	Silver Watch	35 50	48	142
123	Gold Watch	50 00	65	200
124	Lady's Gold Watch	100 00	110	350
	FROM THE UNITED STATES WATCH CO.			
125	Silver Watch	40 00	50	150
126	Silver Watch	66 00	75	275
127	Gold Watch	100 00	100	300
128	Silver Watch	104 00	104	312
129	A Sewing Machine (your choice)	65 00	65	200
	FROM MCALLISTER.			
130	Microscope and 4 objects	10 00	14	40
	FROM COLBY BROS. & CO.			
131	Velocipede for Boys	16 00	16	52
	FROM MCALLISTER.			
132	Magic-Lantern, No. 433	20 00	30	95
	FROM H THOMPSON.			
133	An Easy Chair			
	FROM D. APPLETON & CO.			
134	New American Cyclopædia, 16 vols	80 00	80	213
	FROM G. & C. MERRIAM.			
135	Webster's Unabridged Pictorial Dictionary	12 00	15	45
136	Webster's National Pictorial Dictionary	6 00	10	35
	FROM WESTON & COMPANY.			
137	One back vol. Manufacturer and Builder, unbound, post-paid	1 75	6	25
138	Two back volumes Manufacturer and Builder, unbound, post-paid	3 50	11	37
139	One back vol. Manufacturer and Builder, bound, post-paid	2 50	9	32
140	Two back volumes Manufacturer and Builder, bound, post-paid	5 00	18	58
141	Cover for binding the Manufacturer and Builder, post-paid	60	3	21
142	A $10 Library (your choice from list in special sheet),	10 00	18	58
143	A $ 5 Library,	15 00	24	8
144	A $20 Library,	20 00	31	1 6
145	A $25 Library,	25 00	38	12
146	A $30 Library,	30 00	44	144
147	A $35 Library,	35 00	50	162
148	A $40 Library,	40 00	56	17
149	A $45 Library,	45 00	64	192
150	A $50 Library,	50 00	68	207
151	A $60 Library,	60 00	80	237
152	A $75 Library,	75 00	100	282
153	A $100 Library,	100 00	125	360
154	A choice of good Books (see terms in another column)			
155	A choice of convenient Book-Cases (see special sheet)			
156	A choice of popular Music (see terms in special sheet)			
157	A choice of Games and Toys, (see terms in special sheet)			

A 1 paid through by mail or express.

We have taken especial pains to select in making up our price list the NEWEST and very BEST articles. No charge will be made for boxing or packing any article on our list. The Premiums, Nos. 4 to 7 inclusive, 31 to 35 inclusive, 79, 99, 101, 105 to 108 inclusive, 121 to 128 inclusive, 137 to 141 inclusive, 154, 156, 157, will each be delivered FREE of charge by mail or express (at the Post-office or express office nearest recipient) to any place in the United States or Territories. The other articles cost the recipient only the freight after leaving the manufactory of each, by any conveyance specified.

As an aid to those who engage upon large clubs, we will count subscriptions by *one* individual for 1869, 1870, and 1871, as *three* subscribers toward a premium. Every *new* subscriber should have the work upon the beginning. Bound volumes may be counted in the same way—each as one subscriber—except, of course, when they are obtained as a premium.

Do not fail to note the following Points:

1. All subscribers sent by one person count, though from one or a dozen different post-offices. But

2. State with each name or list of names sent that it is for a premium.

3 Send the names as fast as obtained, that the subscribers may begin to receive the paper at once. You can have any time, from one to six months, to fill up your list.

4. Send the exact money with each list of names, so that there may be no confusion of money accounts.

5. Old and new subscribers all count in premium clubs, but a portion, at least, should be new names; it is partly to get these that we offer premiums to canvassers.

N.B.—The extra copy to clubs of ten or twenty is not given where premium articles are called for.

6. Specimen numbers, cards, and show-bills will be supplied free, as needed by canvassers; but they should be used carefully and economically, as they are very costly.

7. Remit money in Checks on New York banks or bankers, payable to order of WESTERN & COMPANY, or send Post-Office Money Orders. If neither of these is obtainable, Register Money Letters, affixing stamps both for the postage and registry; put in the money and seal the letter in the presence of the postmaster, and take his receipt for it. Money sent in any of the above ways is at our risk.

DESCRIPTIVE LIST OF PREMIUMS.

Every Premium in the annexed list is described in the December MANUFACTURER AND BUILDER, *and also on a* **Special Descriptive Sheet**, *which will be sent free to every one desiring it. We have room here for the following only:*

Nos. 105 to 108—To Procure a Patent without Money.—We have met with many having valuable inventions, which inventors are anxious to get patented, but are unable to afford the expense, and consequently fail to secure the profits which a patent might produce To such as are in this position, we make the following liberal offer: No. **108**—We will prepare an application for a patent, attend to its passage through the Patent Office, and pay all government fees and incidental expenses attending the same, for any inventor pre enting a patentable invention, who will get up a club of seventy-five subscribers for THE MANUFACTURER AND BUILDER for one year at $1.50 each, or 250 at $1 each, and send us the money by post-office order. If this application should be rejected, they may send us an additional list of thirty subscribers at $1.50 each, and the subscription money for the same, on receipt of which we will prepare and prosecute a second application, paying all government fees and incidental expenses. No. **107**—For a list of fifty subscribers at $1.50 each, or 150 at $1 each, with the cash accompanying it, we will prepare an application, attend to its passage through the office, and pay the government fee ($15), the applicant paying the second government fee of $20. No. **106**—For a list of thirty-five subscribers at $1.50, sent in the same way, we will prepare and prosecute an application, the applicant paying the government fee. No. **105**—for twenty-eight subscribers at $1.50 each, or eighty at $1 each, we will prepare and file a caveat, furnish the necessary drawings, (which we also furnish in all the above cases), and pay all government fees. All cases placed in our hands under these arrangements will receive our best attention, equally with those for which our fees have been paid in cash, and will be appealed to the Board of Examiners-in-Chief if necessary, the applicant paying the government fee of $10 on such appeal. If the inventor has no model to accompany his application, he may procure additional subscribers, the premium on which (see cash rates) will enable him to pay for the model. A club of 100 names has been obtained in a single establishment where from 150 to 200 hands are employed. A village of 500 inhabitants will take this number readily.

No. 129—Sewing Machines.—Your choice! A $65 machine for 65 subscribers, at $1.50 each.—It makes no difference to us which machine we send, or whether it is selected at first or at the last moment. No charge for boxing the machines; they go safely as freight. For circulars, giving full particulars in regard to style of machines, fixtures, etc., as well as instructions, send to **Grover & Baker Manufacturing Co., 495** Broadway, New York; **Florence Sewing Machine Co., 505** Broadway, New York; **Wilcox & Gibbs Sewing Machine Co., 658** Broadway, New York; **Singer Sewing Machine Co., 458** Broadway, New York.

Nos. 137, 138—Volumes of the Manufacturer and Builder.—The unbound volumes of THE MANUFACTURER AND BUILDER consist of a set of numbers for a year, each separate in its own paper cover. These volumes amount to a valuable Library on all matters pertaining to the Industrial Arts, and contain more varied information on manufacturing building, and mechanical subjects than can be obtained in books costing three times as much. The price of the volumes unbound is $1.50 each, at the office, or $1.75 if sent by mail, as they must be post-paid. They are profusely illustrated, the engravings used in them having often cost thousands of dollars. For ordinary use, the sets of numbers unbound will answer quite well.

Nos. 139, 140—Bound Volumes of the Manufacturer and Builder.—*New* subscribers almost invariably desire to secure the back numbers of THE MANUFACTURER AND BUILDER from its commencement. Some desire them bound in our uniform style, while others prefer to get the loose numbers and have them bound to suit their own tastes. *Our* binding is very neat, and being done in large quantities at one time, is furnished at a *very cheap* rate. It is moreover very handsome, being of cloth with gilt title and back, sides embossed and ornamented with a neat architectural device stamped in gold. The price of the volumes is $2.50 each, sent post-paid.

No. 141—Covers for Binding the Manufacturer and Builder.—These are described in premium 139, 140. Now ready for 1869 and 1870. Be careful to state *which year* your order. Any country binder will insert the year's numbers in one of these covers at a moderate cost. Price, 50 cents; sent, *post-paid*, on receipt of three subscribers at $1.50 for each cover.

Nos. 142 to 154—Good Libraries.—In these premiums we offer a choice of books for manufacturers, mechanics, artisans, builders and others. The person entitled to any one of the premiums 142 to 153, may select any books desired from the list published in our Special Premium Sheet, to the amount of the premiums, and the books will be forwarded, post or express paid. $25 or $50 worth of books pertaining to the industrial arts will give the boys new ideas, set them to thinking and observing, and thus enable them to make their heads help their hands. Any good book will, in the end, be of far more value to a youth than to have an extra hundred dollars on coming to manhood. ☞ Let the mechanics of a neighborhood unite their efforts, and through these premiums get an industrial library for general use.

No. 154—General Book Premium.—Any one sending twenty-five or more names may select books from our list to the amount of ten cents for each subscriber sent at $1; or thirty cents for each name sent at $1.20; or sixty cents for each name at $1.50. *This for us only for clubs of twenty-five or more. The books will be sent by mail or express, prepaid through by us.*

SPECIMEN COPIES, CIRCULARS, SHOW-BILLS, etc.,

will be furnished free of charge in sufficient quantities to meet the reasonable requirements of agents. We would respectfully request that they do not waste them, but distribute them judiciously. If some unexpected event should prevent them from continuing in the business, they will do the square thing by us by giving their outfit to some friend, who will continue the business where they have left off; and who will no doubt be grateful for the opportunity of receiving profitable employment.

Postage.

Every subscriber pays his own postage at the office where he receives the paper. This is only twenty-four cents per year, or six cents per quarter, payable in advance.

Don't Give up Your Town

until everybody has been supplied with a circular and has had a chance to subscribe; and be sure that you

PUBLICATIONS.

leave your address, so that they may know where to find you in case they should make up their minds to take the magazine after you have left them. Make all drafts, money-orders, and registered letters payable to the order of Western & Company, publishers, and address all communications

WESTERN & COMPANY, Publishers,
NO. 37 PARK ROW, NEW YORK.

TABLE OF Cash PREMIUMS For 1871.

EVERY MAN HIS OWN PAY-MASTER.

STEADY EMPLOYMENT AND GOOD PAY.

		PREMIUMS. At $1 50 each.	PRE'S. At $1 00 each
For every club of	4 subscribers.....	$1 00	
" " "	10 "	3 00	
" " "	15 "	6 00	
" " "	20 "	10 00	
" " "	30 "	16 50	$1 50
" " "	40 "	24 00	4 00
" " "	50 "	32 50	7 50
" " "	75 "	48 75	11 25
" " "	100 "	65 00	15 00
" " "	200 "	140 00	40 00
" " "	500 "	350 00	100 00
" " "	1000 "	700 00	200 00

INTERMEDIATE CLUBS.

It often happens that clubs are made up of numbers that are not found in the above table. Names may be added to clubs at the following rates:

In clubs of 4 and less than 10..$1 25 for each name.
" " 10 " " 15.. 1 20 " "
" " 15 " " 20.. 1 10 " "
" " 20 " " 30.. 1 00 " "
" " 30 " " 40.. 95 " "
" " 40 " " 50.. 90 " "
" " 50 " " 200.. 85 " "
" " 200 " " 500.. 80 " "
" " 500 " " 1000.. 80 " "
" " 1000 and over..... 80 " "

The Profits of the Cash Business, it will be seen by the above tables, are large and accrue rapidly. Every experienced canvasser knows that it is far easier to obtain 4 subscribers to a paper like THE MANUFACTURER AND BUILDER at $1 50 each than to get 1 subscriber to a high-priced magazine, costing $6. This is more strikingly evident when the fact is taken into consideration that our paper, costing only $1 50, is ACTUALLY SUPERIOR IN EVERY RESPECT TO ANY THING OF THE KIND IN THE COUNTRY COSTING TWICE THAT SUM.

There is another point in favor of our Magazine, as compared with a higher-priced periodical. This is the well-known fact, that in a manufacturing establishment, or even in a town, the working-men will rarely look at a paper costing $3 or $6, and the result is that only rich persons, comparatively, and proprietors can be solicited with any success. Now, these persons are scarce in any community; and a paper that comes within the means and comprehension of the masses or majority of the people, of course commands an immensely wide field. Hence, instead of getting only the proprietor of a manufactory, or the rich men of a town, the working-men can be approached with success; and out of a single establishment as many as 100 subscribers have easily been obtained. This is a very important point to canvassers, and where the large profits with but little effort come in. Try it.

Make all drafts, money orders, and registered letters payable to the order of WESTERN & COMPANY, Publishers, and address all communications,

WESTERN & CO., Publishers,
"The Manufacturer and Builder,"
37 Park Row, New York.

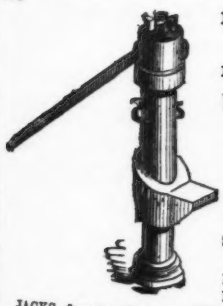
INSTRUCTION.

SCHOOL OF MINES, COLUMBIA COLLEGE.

FACULTY.—F. A. P. BARNARD, S.T.D., LL.D., PRESIDENT; T. EGLESTON, JR., E. M., Mineralogy and Metallurgy; C. F. CHANDLER, PH. D., Analytical and Applied Chemistry; JOHN TORREY, M.D., LL.D., Botany; C. A. JOY, PH. D., General Chemistry; W. G. PECK, LL.D., Mechanics; J. H. VAN AMRINGE, A.M., Mathematics; O. N. ROOD, A.M., Physics; J. S. NEWBERRY, M.D., LL.D., Geology and Paleontology. Regular courses in Mining Engineering; Metallurgy; Geology and Natural History; Analytical and Applied Chemistry. Special students received for any of the branches taught. Particular attention paid to Assaying. For further information and catalogues, apply to

DR. C. F. CHANDLER,
Dean of the Faculty.
nov21-1y-is

RICHARD DUDGEON,



No. 24 Columbia st.,
NEW YORK,
Maker and Patentee of
Hydraulic Jacks
AND
Punches,
Roller Tube Expanders, and Direct Acting
Steam Hammers.
Communications by letter will receive prompt attention.

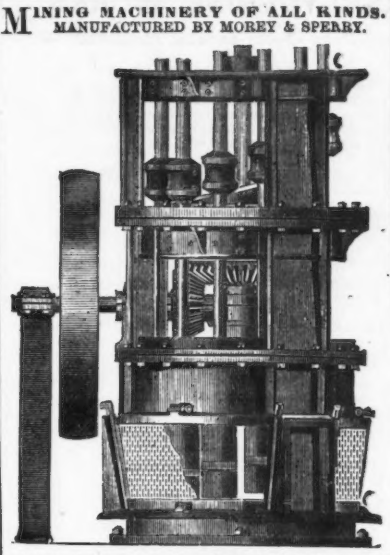
JACKS for pressing on CARWHEELS or CRANK PINS made to order. May22:1y

E. F. DUNNE,
Attorney and Counsellor at Law,
1301 F STREET, WASHINGTON, D. C.,
PACIFIC COAST.—Will practice in all the Federal Courts. Specialty in Patents for Lands, Mines, and Town-Sites. mar15-1y

FILE-COVERS. FILE-COVERS. For preserving the numbers of the ENGINEERING AND MINING JOURNAL. Price $1 50. For sale by WESTERN & CO., 37 Park Row, New York.

MINING MACHINERY. ETC.

MINING MACHINERY OF ALL KINDS.
MANUFACTURED BY MOREY & SPERRY.



HOWLAND PATENT ROTARY BATTERY

of 12 stamps. It requires no frame to put it up. Guaranteed to crush 2½ to 3 tons per day to the stamp. The best Battery ever used for amalgamating gold, or crushing silver ores, dry or wet. Can be put up on a mine in running order for one-half the price of the straight battery, and in three days after its arrival at the mine. 12-stamp battery, 20,000 pounds, with frame complete; 6-stamp battery, 7,000 pounds. Every mill run at shop before shipping.

CALIFORNIA STAMP MILLS,

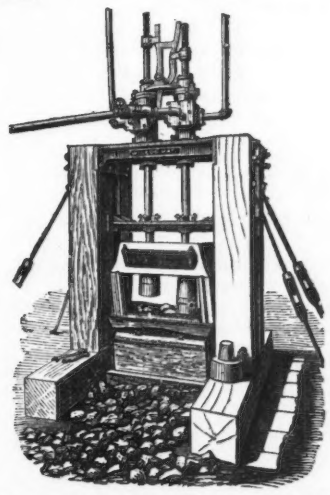
All the various styles of Pans, Amalgamators, Rock Breakers, Separators, Settlers. Concentrators, Dry or Wet, for working Gold, Silver or Copper Ores, the same as built in California and at lower prices. SHOES AND DIES made of the best white iron. Send sizes and we will make patterns and forward Shoes and Dies at low prices. Engines, Boilers and fixtures, and other Machinery made to order. Also, Howland's Patent Rotary Valve Double or Single Engines.

Irons for the best California stamp mill, straight battery, complete. Also, Irons for low mortar, old style mill, and all other kinds.

Send for a Circular.
Address
MOREY & SPERRY,
Jan 10:y 95 Liberty Street New-York.

THE WILSON PATENT
Steam Stamp-Mill Company,
OF PHILADELPHIA, PA.

Are now prepared to supply Miners and other parties with their



New Steam Stamp-Mills
AT THE SHORTEST NOTICE.

These Mills have now been in operation for upwards of a year, and have proved to be the most durable and efficient, as well as the lightest for transportation, of any mills now used. The valve gear is of the simplest and most durable construction, readily adjustable by movable cams on the piston rods or stamp stems, thereby giving the operator absolute control of the length and velocity of motion and force of the blow. These Mills are adapted for both dry and wet crushing, and for the hardest rock or softest cement. These Mills are every way equivalent to a Twenty Stamp Mill. For further particulars call on or address

THE WILSON PATENT STEAM STAMP-MILL COMPANY,
Aug31-1y 326 Walnut street, Philadelphia.

KROM'S DRY ORE CONCENTRATOR.

Concentration by means of Air

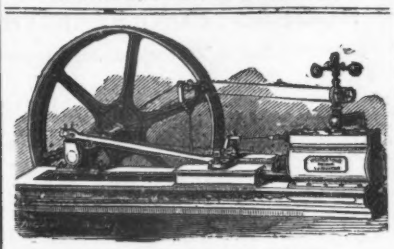
has long been attempted, but hitherto without satisfactory results. S. R. Krom has invented and patented machines which concentrate the various ores more perfectly than can be done by any other means.

The *MECHANICAL COMBINATIONS* are extremely simple, the machines therefore correspondingly durable. A continuous self-delivery of ore on one side and tailings on the other is effected, hence very little attention is required, except keeping the hopper supplied with ore The power of one man is sufficient to operate a mach in that will concentrate one ton per hour.

PARTIES INTERESTED IN MINING are invited to call at No. 210 Eldridge Street, New York, where they may see a machine in operation, and have samples of their own ores crushed and concentrated.

Illustrated Circulars may be had on application to
STEPHEN R. KROM,
an10,1y-is No. 210 Eldridge Street, N. Y.

ENGINES, IRON WORK, ETC.



TODD & RAFFERTY.
GENERAL
MACHINERY MERCHANTS, ENGINEERS, AND MACHINISTS,

Manufacturers of Stationary and Portable Steam Engines and Boilers; also Flax, Hemp, Tow, Oakum, and
ROPE MACHINERY,
MILL GEARING,
SHAFTING.
Lathes, Planers, Drills, Chucks, etc. Iron and Brass Castings. Judson & Snow's Patent Governors constantly on hand.
OFFICE AND WAREROOMS, NO. 10 BARCLAY STREET, N. Y.
Office and Works, Paterson, New Jersey.
JOSEPH C. TODD. oct-27-tf. PHILIP RAFFERTY.

CIRCULAR SAWS WITH EMERSON'S PATENT MOVEABLE TEETH.

EMERSON'S PATENT MOVABLE TOOTHED CIRCULAR SAWS

These Saws are meeting with unprecedented success, and their great superiority over every other kind, both as to efficiency and economy, is now fully established
Also,
EMERSON'S PATENT PERFORATED CIRCULAR AND LONG SAWS,
(All Gumming avoided,) and
EMERSON'S PATENT ADJUSTABLE SWAGE,
for Spreading, Sharpening, and Shaping the teeth of all Saws. Price, $5. Manufactured by the
AMERICAN SAW COMPANY
Office No. 1 Ferry St., corner Gold St., New York.
Factory, Trenton, N. J. Branch Office for Pacific Coast, No. 606 Front St., San Francisco, Cal.
Send for new Descriptive Pamphlet and Price List.
july1-1y

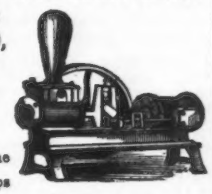
COOPER'S GLUE AND REFINED GELATINE.

COOPER HEWITT, & CO.,
NO. 17 BURLING SLIP, NEW YORK.
Bar Iron, Braziers' Rods, Wire Rods, Rivet and Machinery Iron, Iron and Steel
Wire of all Kinds, Copperas,
&c., &c.
RAILROAD IRON, COOPER WROUGHT IRON BEAMS AND GIRDERS,
Semi and Cast-Steel, Gun-Barrel and Component Iron,
PUDDLED AND REFINED CHARCOAL BLOOMS,
Ringwood Anthracite and Charcoal Pig Iron.
Works at Trenton and Ringwood, N. J.
May 17:1y

ALBERT BRIDGES,
MANUFACTURER AND DEALER IN
Railway and Mining Supplies and Machinery.

Hot and Cold Punched Nuts, Bolts, Lag Screws and Washers.
Belting, Packing Hose, Rubber Springs, Car Trimmings, Steam Pumps.
Bali's Patent Telescope Jack.
NO. 46 CORTLANDT STREET,
P. O. Box, 2843. NEW YORK.
Aug 31-1y

J. CLAYTON'S
Patent Fly Wheel and Direct Action
STEAM PUMPS,
HAND PUMP AND STEAM ENGINE COMBINED.



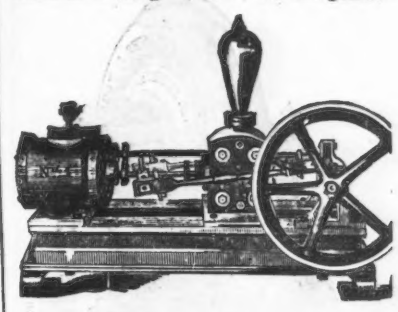
These pumps are the cheapest first-class pumps in the market.

All sizes made to order at short notice.

JAMES CLAYTON, 24 & 26 Water st.,
Office: 80 John street, New York.
Nov13-tf Brooklyn, N. Y.

STEAM PUMPS.

THE WOODWARD
Steam Pump Manufacturing Company
MANUFACTURERS OF THE
WOODWARD PATENT IMPROVED SAFETY
Steam Pump and Fire Engine.

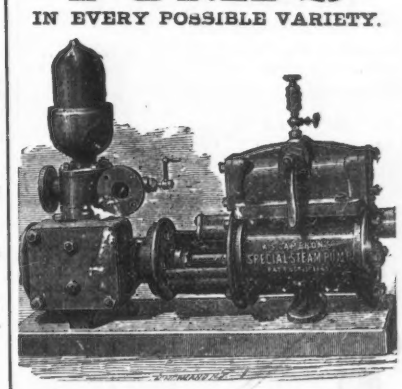


STEAM, WATER, AND GAS FITTINGS OF ALL KINDS.

Also dealers in WROUGHT IRON PIPE, BOILER TUBES, etc. Hotels, Churches, Factories, and Public Buildings, heated by Steam, Low Pressure.

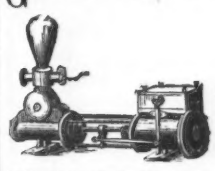
Woodward Building, 76 and 78 Centre street, corner Worth street, New York. Formerly 77 Beekman street
mar 14-1y GEORGE M. WOODWARD, Pres't

PUMPS
IN EVERY POSSIBLE VARIETY.



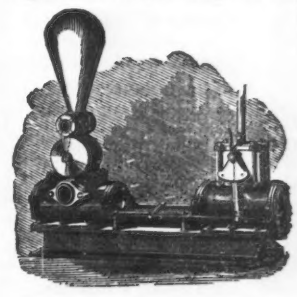
A. S. CAMERON & CO.,
FOOT 23d STREET, E. R.,
oct18:1y NEW YORK.

GUILD & GARRISON, MANUFACTURERS OF



Steam Pumps,
Vacuum Pumps,
Steam Engines,
Vacuum Pans,
And all the various connections. For sale at the STEAM PUMP WORKS, 26, 28 and 30 First street, Williamsburgh, N. Y.
ap14-6m

Niagara Steam Pump Works.



FIRST PREMIUM AMERICAN INSTITUTE, 1867.

CHARLES B. HARDICK,
9 ADAMS STREET, BROOKLYN, N. Y.
Sole Manufacturer of
HARDICK'S PATENT DOUBLE-ACTING
Steam Pump and Fire Engine.
Patented in England, Belgium and France. Send for circular. feb-18-1y

WOOD ENGRAVING
EXECUTED AT THE OFFICE OF
The Engineering and Mining Journal
No. 37 PARK ROW, NEW YORK CITY.

DUNCAN, SHERMAN & CO.,
BANKERS,
Corner of Pine and Nassau Streets, New York.
Issue Circular Notes and Letters of Credit for Travelers available in all the Principal Cities in the World.

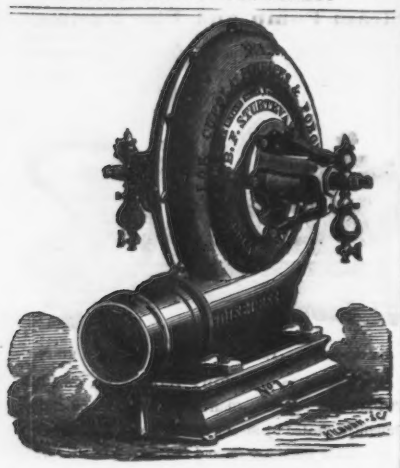
TRANSFERS OF MONEY TO EUROPE AND THE PACIFIC COAST BY TELEGRAPH.
Interest allowed on Deposits. feb-1y

AGENTS AND CANVASSERS WANTED
IN EVERY CITY AND TOWN IN THE UNITED STATES.
FOR THE
Engineering and Mining Journal.
Liberal inducements. Specimens sent free. Address
WESTERN & COMPANY,
37 Park Row, New York

Advertisements.

Advertisements admitted on this page at the rate of 40 cents per line. Engravings may head advertisements at the same rate per line, by measurement, as the letter press.

MACHINISTS' SUPPLIES.



B. F. STURTEVANT'S
PATENT IMPROVED
PRESSURE BLOWER,
FOR CUPOLA FURNACES AND FORGES.

Also manufacturer of the Sturtevant Patent Improved Fan Blower and Exhaust Fan. Send for illustrated catalogue.
B. F. STURTEVANT, 72 Sudbury street, Boston, Mass.

E. LYON, MANUFACTURER OF
Patent Portable Hydraulic Jacks and Punches.
NO. 470 GRAND STREET, NEW YORK

For Raising Heavy Weights, such as Locomotives Boilers, Guns, Heavy Machinery, Wrecking Purposes, putting together Water and Gas Pipes, pushing off Cranks and Propellers, Pulling, Proving Chains and Ropes, setting up Rigging, or Pulling Stumps, Punching and Shearing Iron, Die-Sinking, etc.

☞IMPROVED PATENT HYDRAULIC JACKS, that run out their entire length in a HORIZONTAL or any other position.

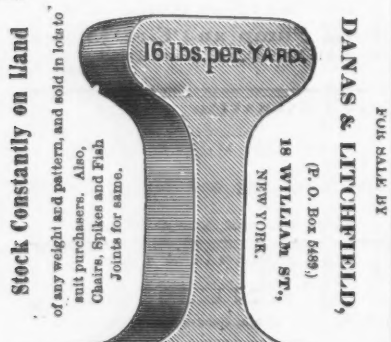
PATENT HYDRAULIC PUNCH,
For Punching Iron, Die-Sinking, etc. Ap 12;1y

H. A. ROGERS & CO.,
Successors to
JOHN ASHCROFT, and WALTON & Co.,
Railway & Machinists' Supplies,
50 and 52 JOHN STREET.

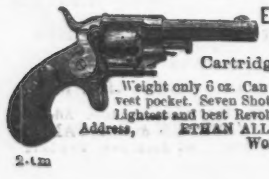
Sole Agents for
ASHCROFT'S STEAM GAUGE,
Also Agents for
LINDSAY WRENCHES,
STURTEVANT BLOWERS,
JUDSON GOVERNORS,
WILDER'S PATENT PIPE-WRENCH AND CUTTER.
Manufacturers of
STEAM and WATER GAUGES,
Importers of
SCOTCH GAUGE GLASSES.

Steam Gauges Repaired.

RAILROAD IRON FOR MINES.


16 lbs. per YARD.
Stock Constantly on Hand
of any weight and pattern, and sold in lots to suit purchasers. Also, Chairs, Spikes and Fish Joints for same.
DANAS & LITCHFIELD,
(P. O. Box 5496)
18 WILLIAM ST., NEW YORK.
FOR SALE BY
25 320/2240 Tons per Mile.

Light Locomotives, for use in Collieries, Mines, etc.
mch13-6m



E. Allen & Co's
NEW MODEL
Cartridge Revolver.
Weight only 6 oz. Can be carried in the vest pocket. Seven Shots, 22-100 calibre. Lightest and best Revolver in the world.
Address, ETHAN ALLEN & CO.
WORCESTER, Mass.
2-tm

ENGINEERS' SUPPLIES.

STEAM ENGINES
FROM 4 TO 500 HORSE-POWER,
Including CORLISS PATENT CUT-OFF ENGINES, SLIDE VALVE STATIONERY ENGINES, and PORTABLE ENGINES. Also, IMPROVED CIRCULAR SAW MILLS, etc.
Send for Descriptive Circular and Price List.
WOOD & MANN STEAM ENGINE CO.,
UTICA N. Y.
Warerooms, 42 Courtland Street, New York; and 201 and 203 South Water Street, Chicago, Ill.
nov-7-1y-os

LAFLIN & RAND,
POWDER CO., 21 Park Row, opposite Astor House, New York,
invite attention to their facilities for delivering
BLASTING POWDER,
SAFETY FUSE,
ELECTRICAL BLASTING APPARATUS, &c.,
wherever required, from having nine manufactories in different States, beside agencies and magazines at all distributing points. nov. 1:1y

B. KREISCHER & SON,
New York Fire Brick

AT
STATEN ISLAND
Clay Retort Works.
Established 1845.
B.K FIRE BRICK
Office, 58 Goerck Street, Corner Delancy Street, East river, New York. mar28-1y-q

Four First Premiums, American Institute, 1870.
THE ALLEN ENGINE WORKS,
Fourth Av. and 130th and 131st Streets,
New York City.
MANUFACTURERS OF
THE ALLEN ENGINE
PORTER'S GOVERNOR,
The Allen Boiler, and
STANDARD STRAIGHT-EDGES,
Surface-Plates, and Angle-Plates.
Four First Premiums awarded at the Fair of the American Institute, 1870.
Send for an Illustrated Circular.

Fishkill Landing Machine Works,
Established 1853.
FISHKILL-ON-THE-HUDSON, N. Y.

STEAM ENGINES,
Iron and Brass Castings, Forgings, Boilers, and Machinery.
Sole Manufacturers of the celebrated LOOMIS STEAM ENGINE, with Patent Variable Cut-off by the Governor.
Jobbing and Repairs promptly attended to.
JAS. L. TELLER, Secretary. MINO SAGE, President
sept13:1y

NEW YORK BELTING AND PACKING COMPANY. The oldest and largest manufacturers the United States of
Vulcanized Rubber Fabrics,
Adapted to Mechanical Purposes,
Invite the attention of all who are interested in the sale or use of such articles to the high standard quality and low prices of their various manufactures, comprising
Machine Belting, Steam Packing, Leading Hose, Suction Hose, Car Springs, Wagon Springs, Billiard Cushions, Grain Drill Tubes,
etc., etc., etc.,
"TEST" HOSE
made expressly for the use of Steam Fire Engines, and will stand a pressure of 400 pounds per square inch. Officers of Fire Departments requiring new hose, will find this much superior in strength and quality to any other.
PATENT SOLID EMERY VULCANITE WHEELS, a composition of rubber and emery, making a very hard uniform substance of the nature of stone throughout. These wheels for grinding and polishing metals, "gumming" saws, etc., are the most economical and effective tools that can be used.
WAREHOUSE, 37 AND 38 PARK ROW, NEW YORK.
JOHN H. CHEEVER, Treasurer.
☞Price lists and further information may be obtained by mail or otherwise on application.
oct30-1y-os

THEODORE ALLEN,
ENGINEER,
No. 45 William street, New York.
Designs and Specifications prepared for all kinds of Iron Ships and Steam Machinery. Construction and Repairs superintended. Experiments conducted. Advice given, etc. All kinds of Machinery furnished. Manufacturers' prices. feb8-t

COAL SHIPPERS.

HONEY BROOK COAL COMPANY, Exclusive Miners and Shippers of the Celebrated
Honey Brook Lehigh Coal,
23 Trinity Building,
No. 111 BROADWAY, NEW YORK.
Wharves, Elizabethport, N. J. Philadelphia office 209 Walnut street.
ap20-1y J. B. McCREARY, President.

WHITE, FOWLER & SNOW.
Wilkesbarre and Lehigh Coal,
FOR STEAM AND FAMILY USE.
OFFICE
Room No. 75, 111 BROADWAY, (Trinity Building).
JNO. WHITE,
jan1-1y LINDLEY H. FOWLER,
LOUIS T. SNOW.

THE NEWBURGH ORREL COAL COMPANY.
Mines at Newburgh, Preston Co., W. Va.
Company's Office, No. 52 S. Gay St. Baltimore, Md.
C. OLIVER O'DONNELL.....President
CHAS. MACKALL.....Secretar.
This Company offer their very superior Gas Coal at lowest market prices.
It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.
It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York, the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y., the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.
The best dry coals shipped, and the promptest attention given to orders. sep21-1y

RANDOLPH BROTHERS, Sole Agents of the original
Spring Mountain Lehigh Coal.
Extensively used for Smelting Iron.
☞Rooms, 28 and 30 Trinity Building,
pr6tf NEW YORK.

WILKESBARRE COAL, DELIVERED Direct from the Mines of
The Wilkesbarre Coal and Iron Co.,
or for re-shipment at
HOBOKEN AND JERSEY CITY.
OFFICE:
ap1-1y 80 Broadway, New York.

POWELTON COAL AND IRON COMPANY Sole Shippers of the Celebrated
Powelton Semi-Bituminous Gas
AND ANTHRACITE COALS,
104 Walnut street, Philadelphia.
BRANCH OFFICES:
New York, Trinity Building; 17 Doane street, Boston. Cleveland, O.; Pittsburgh, Pa. jan30-1s

THE DESPARD COAL COMPANY OFFER their Superior DESPARD COAL to Gas Light Companies throughout the country.
MINES IN HARRISON COUNTY, West Virginia.
Wharves, Locust Point, Company's Office, No. 29 South st. } Baltimore.
AGENTS:
PARMELE BROTHERS, No. 32 Pine street, New York.
BANGS & HORTON, No. 31 Doane street, Boston.
Among the consumers of Despard Coal we name Manhattan Gas Light Co., New York; Metropolitan Gas Light Co., New York; Jersey City Gas Light Co., Jersey City N. J.; Washington Gas Light Co., Washington, D. C. Portland Gas Light Co., Portland, Maine.
☞Reference to them is requested. may30-1y

LEWIS AUDENRIED & CO., MINERS AND Shippers of the following celebrated
ANTHRACITE COALS.
From Philadelphia and the Mines,
DIAMOND, Red Ash; SPOHN, Red Ash; ORCHARD, Pink Ash; BROAD MOUNTAIN, White Ash; LOCUST MOUNTAIN, White Ash; BLACK HEATH, White Ash; Old Company's Lehigh; Wilkesbarre.
From Port Johnston and Jersey City,
Old Co.'s Lehigh, Hazleton, Wilkesbarre, and Shenandoah Coals.
Also the superior CUMBERLAND COALS.
BROAD TOP, at Philadelphia. BARTON, at Baltimore. BARTON, SEMI-BITUMINOUS, at Alexandria.
GEORGES CREEK, GEORGES CREEK
203 Walnut street, Philadelphia; 14 Kilby street, Boston, 34 Westminster st., Providence; 24 Second st., Baltimore, 110 BROADWAY, NEW YORK. Jan13.y

G. B. LINDERMAN & CO.,
MINERS,
Sugar Loaf, Lehigh Coal.
OFFICE, 50 TRINITY BUILDING, 111 BROADWAY
may23-1y NEW YORK.

COXE BRO.'S & CO., CROSS CREEK COLLIERY Miners and Shippers of the Celebrated
Cross Creek Free Burning Lehigh Red Ash COAL.
FROM THE BUCK MOUNTAIN VEIN.
OFFICES:
Philadelphia, No. 341 Walnut street.
Drifton, Jeddo P. O., Luzerne Co., Pa.
Agent in New York, SAMUEL BONNELL, Jr., Room 43, Trinity Building,
feb-1y 111 Broadway.

MICROSCOPES FOR SCIENTIFIC INVESTIGATIONS and Educational Purposes. Pri sent free. T. H. McALLISTER, Optician,
c21-6m. 49 Nassau street, N. Y.

MISCELLANEOUS.

Mount Savage FIRE BRICK.
GOVERNMENT STANDARD.
Manufactured by the
Mount Savage Fire Brick and Mining Company.
This Company having acquired the Fire Clay properties and Brick Works of the
Consolidation Coal Company,
will receive orders for their unequalled FIRE BRICK for Blast, Puddling, Smelting and Glass furnaces. Diagrams of shapes and prices will be furnished on application to
J. S. MACKIE, Pres., 71 Broadway, New York, Room 41.
JAMES A. MILLHOLLAND, Vice Pres.,
Dec. 7.tf Mount Savage, Maryland.

THE BISHOP GUTTA-PERCHA WORKS,

422, 424 & 426 East 25th St.
Office at Factory, NEW YORK.
SAMUEL C. BISHOP, Proprietor,
The *only* manufacturer in the United States of every variety of goods, made from *Pure Gutta-Percha.*

SUBMARINE TELEGRAPH CABLES.
Submarine Wires, insulated for Mining and Blasting use.
Telegraph and Electric Wires for office and other uses, of all sizes; Cotton and Silk Covered Wires, of all sizes; Bishop's Compound Cordage for air lines and ouvice connections; Underground Wires, covered with Gutta-Percha and Lead protection; Underground Wires, with fibre and Bishop's Compounds.
Any kind required made to order.
In addition to Telegraph and Electric Goods, I make 14 kinds of Pure Gutta-Percha goods, such as Belting for use in Water; Sheet for Surgical use; Sheet for various Mechanical uses; Lining for Acid and Chemical Baths; Bottles, Pitchers, and Funnels for Acids; Trunk Sheets for Caps and Hats; Soda and Beer Pipe; Boxes for Flax Machinery, etc., etc.
N. B.—TILLOTSON & CO., 8 Dey street, New York, and BLISS, TILLOTSON & CO., 247 South Water street, Chicago, are General Agents for the sale of any Telegraph and Electric Goods made by me at Factory prices.
JOHN THORNLEY, 503 Chestnut street, Philadelphia, Pa., is Agent for the sale of any goods made by me at Factory prices.
☞Orders also received at Factory for all kinds made.
Any goods of my manufacture, "excepting Telegraph and Electric Goods," are for sale in New York, by H. G. NORTON & CO., 26 Park Place; RUBBER CLOTHING CO., 347 Broadway; A. D. & C. A. HODGMAN, 201 Broadway, N. Y. sep13:4m

THE BEST TURBINE WHEEL.
SWAIN'S
Gave **5 Per Cent.** better results at the **Lowell Test** than any of its **Highly Polished Competitors.**
It will give from 30 to 100 per cent. more power, in proportion to its size, than any other wheel.
Guaranteed to give from 10 to 50 per cent. more power, with the same water, than any other wheel in the market. It is the best made, most compact, runs longer without repairs, and gives better satisfaction than any other wheel.
☞Send for report of tests, with description and diagrams.
SWAIN TURBINE CO.,
Dec 6:6m North Chelmsford, Mass.

HORTON AND MABIE
PEEKSKILL, NEW-YORK.
Fire Brick Works.
MANUFACTURERS OF ALL SHAPES OF
FIRE BRICK
FOR IRON WORKS, LIME KILNS, FANNERS, &c., &c., &c.
Particular attention given to the manufacture of linings for Cupola Furnaces.
Blocks and Tiles for all Purposes.
BRASS FURNACE CIRCULARS.
Stove and Range Linings of every description to order.

MACHINISTS' SUPPLIES.

HYDRAULIC WORKS.
MANUFACTORY,
BROOKLYN, N. Y.
Steam Pumping Engines, Single and Duplex, Worthington's Patent, for all purposes, such as Water Works Engines, Condensing or Non-condensing; Air and Circulating Pumps, for Marine Engines; Blowing Engines; Vacuum Pumps, Stationary and Portable Steam Fire Engines; Boiler Feed Pumps, Wrecking Pumps.
MINING PUMPS,

Water Meters, Oil Meters; Water Pressure Engine Stamp Mills for Gold, Silver and Copper Ore; Bacon's Gate-it Amalgamators for Gold and Silver; Steam and Gas Pipe, Valves, Fittings, etc. Iron and Brass Castings.
☞Send for Circular.
H. R. WORTHINGTON,
feb1-1y 161 Beekman street, New York.